

S I N C L A I R

QL WORLD

OF MICE AND MACHINES

The complete
guide

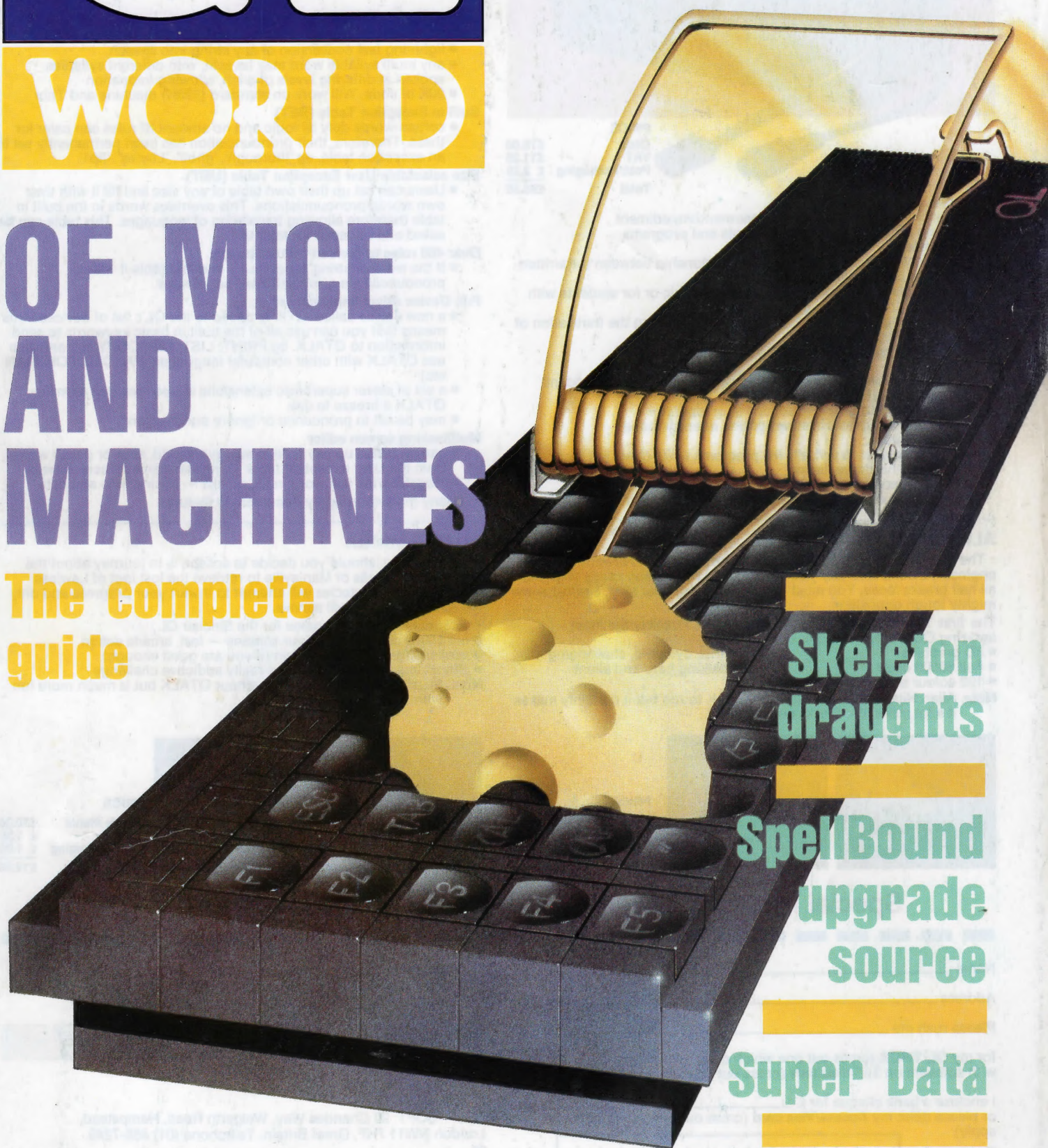
Every month £1.25 November 1987

DENMARK DKR 40.00

GERMANY DM 9.00

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SWITZERLAND SFR 6.50



Skeleton
draughts

SpellBound
upgrade
source

Super Data

Introducing

QTALK



Qtalk Applications

1) Health

- a viable solution to speech impairment/impediment
- allows the blind to write documents and programs

2) Education

- an excellent tool for teaching the relationship between the written and the spoken word
- a valuable aid to those assisting the dyslexic or for students with reading problems
- an amazing new method for teaching or learning the translation of one language to another
- touch typing made easy with keyboard echo

3) Industry

- enables verbal output of readings/warnings from independent peripherals. (BUS, IEEE, RS232 etc)
- can be used to give instructions to an operator
- could be set up as an answerphone or entryphone

4) Entertainment

- allows the user to verbally list programs while checking them against a hardcopy listing
- can be made to hum musical tunes
- provides a whole new dimension to computer games

PRICE	
Qtalk	£75.00
VAT	£11.25
Post/Packaging	£ 2.25
Total	£88.50

Hardware Features

RS232C, Selectable baud rate, DCE or DTE

- will operate on any computer with an RS232 port
- at any standard baud rate
- does not tie up the expansion port

Three adjustable presets:

- allows adjustment of Volume, Pitch and Pitch range (16 levels)

Black Eurocard enclosure, QL plug, power lead, socket and serial cable

- simply plugs in between your power supply and QL
- maintains the integrity of your computer system

(Note. CST Thor version is powered through the serial lead)

Software Features

Full 68000 Text To Speech software incorporating 16 levels of pitch.

- lightning fast conversion of any string into speech
- any multi syllable word may be split, with different syllables spoken at differing levels of pitch, allowing intonation
- 20K of code. Will work on standard (128K) machine and Thor

Built in Exception Table (BET)

- certain words defy all logic and no amount of rules can cater for these. Therefore, their pronunciation has been permanently set in an exception table. eg 'thorough', 'ghoti', 'Lbytes', 'flp1'

Size selectable User Exception Table (UET)

- Users can set up their own table of any size and fill it with their own words/pronunciations. This overrides words in the built in table therefore allowing translation of languages. This table can be saved and reloaded for later use.

Over 400 rules to convert text to speech.

- If the word or string is not found in either table it will be pronounced via a sophisticated set of rules.

Full Device driver implementation.

- a new device called 'QTK' is added to the QL's list of devices. This means that you can use all of the built in basic keywords to send information to QTALK. eg PRINT, LIST, DIR, COPY etc. and also use QTALK with other computer languages (PASCAL, FORTRAN etc)
- a set of clever superbasic extensions is also included to make QTALK a breeze to use
- may be set to pronounce or ignore punctuation

Multitasking screen editor

- can be called up any time to set up and add, alter or delete words from the User exception table. Comprehensive on screen help.
- Hopefully the last word in QL clocks — talking time and date

Many more thoroughly documented features

ALIEN HIJACK

The year is 2003 and you are working on the S.P.C. Forward, as ship's engineer. On the 23rd day you are attacked by an alien space ship and all hell breaks loose. You must regain control of your ship, against some mighty tough opposition.

The first TALKING game for the Sinclair QL. Possibly the most amazing QL graphics seen to date

- 3D graphics
- Full 68000 code
- 192 colour screens
- fast, dynamic, challenging
- talking hero and aliens

Note. Alien Hijack does not require QTALK to run but it certainly makes it a lot more fun. Works on a 128K QL.



PRICE	
Alien Hijack	£15.00
VAT	£ 2.25
Post/Packaging	£ 1.00
Total	£18.25

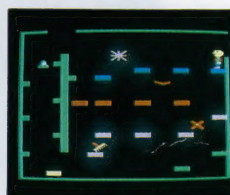
PUZZLE MANIA

Your mission, should you decide to accept, is to journey about the danger ridden cells of Maniaville to retrieve the lost loot of Lawless Lenny. Several obstacles will attempt to thwart your progress and only the smartest gamer will survive.

The second TALKING game for the Sinclair QL

- full 68000 code — 40 colour screens — fast, arcade action
- spoken clues to help you win (if you are good enough)
- almost impossible to beat — a really addictive challenge

Note. Puzzle Mania can operate without QTALK but is much more fun with it.



PRICE	
Puzzle Mania	£10.00
VAT	£ 1.50
Post/Packaging	£ 1.00
Total	£12.50

Special Introductory Offer

Buy QTALK, PUZZLE MANIA and ALIEN HIJACK and receive £5.00 discount pre VAT total (offer closes 31st Nov 1987)

Name _____ SQLW11

Address _____

Please rush me _____

for my **QL/THOR** (cross out one which does not apply)
with software on 3½" **disc/mdv** (cross out one which does not apply)

I enclose a **bank cheque** for £ _____
or please debit my **Access/Visa card** (cross out one which does not apply)

Card number _____

Expiry date _____ Signature _____

I appreciate that no funds will be deposited until despatch of goods.
Please allow up to 21 days for delivery (airmail).

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(New Zealand)

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or
Maxtronics R & D Ltd: 26A Conway Street, Christchurch 2,
New Zealand. Telephone (64-3) 325-546

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If you have any comments or difficulties, please write to The Editor, Open Channel, Trouble Shooter, Technical Helpline or Psion Solutions.

We will do our best to deal with your problem in the magazine, though we cannot guarantee individual replies. Back issues are available from the publisher, price £2 U.K., £2.75 Europe. Please telephone 089 283 4783 to check availability.

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WORLD — 1987

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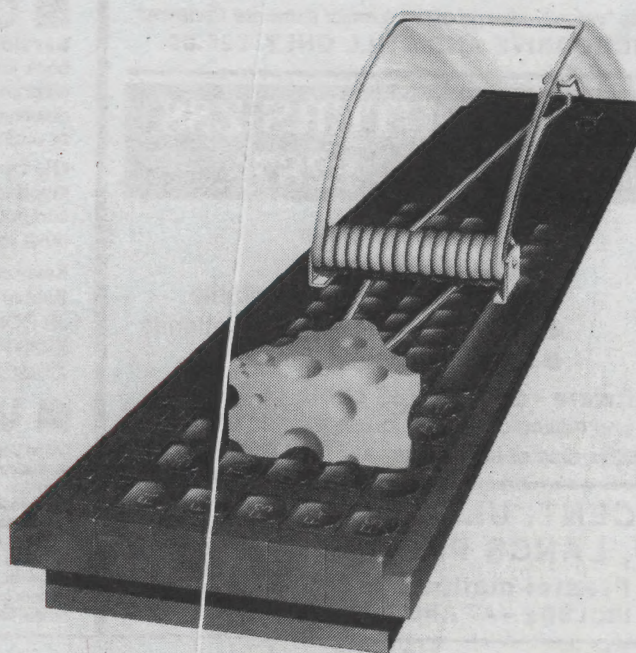
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NEXT MONTH

ROMs & EPROMs

There is plenty of ROM-based software for the QL. New products give the option of multiple ROMs or downloading the appropriate software from a disc.

We examine the market, giving details of availability, compatibility and, above all, usefulness.

PSION REVISION

First there was version one of Quill, Archive and such. One problem was that they did not work, or certainly not properly. Version followed version but are the upgrades really worth having? Simon Goodwin reports on Psion programs up to version 2.38 and also looks at Archive, run-time Archive and Arch-dev.

SECTOR SOFTWARE

0772 454328

SPELL BOUND

REAL TIME spelling checker for Quill or The Editor V1.17 onwards on the expanded Sinclair QL.

Spell Bound checks input by the character against its 30,000+ word dictionary. It has 5 switchable modes of operation to suit a variety of typing styles with the dictionary available at all times. Spell Bound displays examples words on request and operates with no discernable reduction in the operating speed of Quill. The dictionary is fully user expandable to memory/media limits.

Available on disc or Microdrive at only £29.95

TASK MASTER

THE ULTIMATE

- **NOT JUST** another multi tasking program, but a complete front end memory management system for the expanded Sinclair QL.
- **ON SCREEN CALCULATOR** with many features including delta percentage mark up.
- **POWERFUL FILE MAINTENANCE** of discs and Microdrives.
- **NOTEPAD** with word wrap and 'send note' feature.
- **SOFTWARE RESET** scans for, and warns of any vulnerable open files at close down.
- **SERIAL PRINTER BUFFER** user configurable up to 32K
- **DUPLICATE CODE SHARING** allows multiple copies of the same program without losing memory to additional code space e.g. 12 copies of Abacus with 230K free.
- **COMMAND FILE MODULE** easily creates files which will operate the machine in your absence. For example it could load quill, fill in your address, type a standard letter and print it. You will, however, have to post it yourself.
- **TASKMASTER** does not consume vast amounts of memory. If you wish only to use the multi tasking module, that is all you need to load, thus using only a small slice of memory. The choice is always yours
- **USER FRIENDLY.** It was described as "virtually idiot proof" by a major software reviewer

AVAILABLE ON DISC OR MICRODRIVE AND STILL ONLY £25.00

CAMBRIDGE COMPUTERS Z88

- from Sir Clive Sinclair

£287

- Built in screen
- Full size keyboard
- Built in word processor
- spreadsheet and database
- 32K RAM
- Diary and Calculator
- Comms software
- All Z88 accessories available
- Runs for 20 hrs on 4 AA batteries
- Many more features

● **QZ QL - Z88 file transfer software - £15 (QI-Z88 cable - £8)**

Allows you to use the QL for storage and editing of files, or to use the Z88 as a portable data terminal. Available on 3.5in. disc or Microdrive

39 WRAY CRESCENT, ULNES WALTON, LEYLAND, LANCS PR5 3NA

Tel: 0772 454328, Prestel mailbox 772454328

ALL PRICES INCLUDE VAT AND P & P



TOUCH TYPIST

Don't even think about buying a replacement keyboard until you know how to use the one you already have. Why type slowly when you can be typing at professional speeds. Touch Typist is the fastest typing tutor available for the Sinclair QL. It will teach you to type at up to 211 wpm. It is 100% machine code and has:

- 3 teaching modes
- adjustable speed and accuracy targets
- very fast interactive keyboard
- results display graphs

The full lesson editor will allow you to customise any or all of the 200 lessons which can then be saved to create a library of custom lesson sets. Touch typist will run from disc, Microdrive or ramdisc. Available on disc or Microdrive for only £12

"Succeeding admirably as a serious course intended for beginners and experienced typists alike...includes the professional polish of good quality software" - QL World

SOFTWARE

Touch Typist	£12.00	Toolkit 2 (EPROM)	£34.00
Task Master	£25.00	TechniQL	£49.00
Spellbound	£29.95	Media Manager	£40.00
Turbo Quill+	£14.00	Front Page	£23.00
Turbo Quill	£12.00	Scrabble	£15.00
Cartridge Doctor	£13.00	Keydefine	£10.00
Eye Q	£29.00	Talent Workbench	£25.00
Turbo	£99.00	Supercharge	£49.00
The Editor (DP)	£30.00	Pision Chess	£17.00
Project Planner	£30.00	Better Basic (DP)	£20.00
Forth	£34.00	Home Finance	£20.00

Coming soon FLASHBACK

QL SPARES

Service Manual - This is the most up to date book for repairing the QL. It contains all circuit diagrams, faultfinding charts and oscilloscope displays to enable you to repair your own QL or understand how it works **£25.00**

QL Test Software - Including RS232 loopback lead. Tests all major functions of the computer- sound, colour, keys, RS232, Microdrive etc. Used by repair companies - **£14.00**

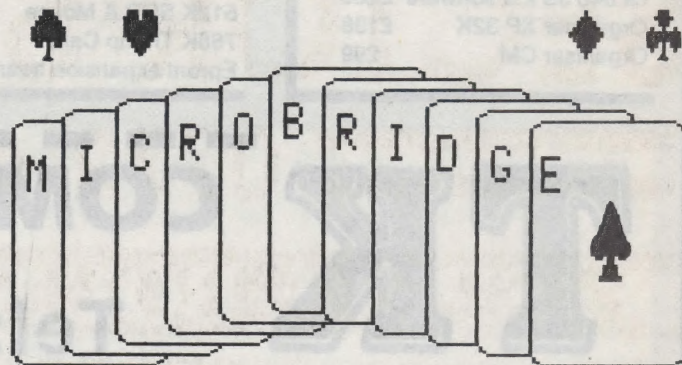
Keyboard membrane	£6.00
Bubble mat	£3.00
JS ROM set	£28.00
ZX8301 ULA	£12.00
ZX8302 ULA	£13.00

VARIOUS

Trump Card	£195.00
QL dustcover	£5.00
Microdrive labels on tractor feed per 100	£3.50
20 Microdrives in Transform storage box	£39.00
Internal 640K memory upgrade	£99.00
Miracle autodial modem	£45.00
Astracom 1000 modem	£199.00
Microvitec 1451DQ3 dedicated monitor	£260.00
(Superb graphic display)	
Parallel printer interface	£19.50

The Power Behind The Button

TURBO "Second to none . . . excellent . . . nothing can match it . . . takes Super BASIC & the QL into a new era" DESKTOP PUBLISHER "A very very impressive system . . . in a league of its own . . . will not make the coffee, but they are working on it" PROFESSIONAL ASTROLOGER "Descriptions such as superb, ultimate, excellent are barely adequate, a classic . . . the best of them all . . . the most comprehensive ever produced" SUPERCHARGE "A runaway success . . . QLiberator lacks Supercharge's finer features" MEDIA MANAGER "has every possible facility . . . a world beater" EDITOR "Superb . . . positively scintillates . . . a joy to use . . . DP's best program" SUPERFORTH "The definitive FORTH . . . excellent . . . very fast" EYE-Q "Brilliant . . . powerful . . . superb . . . monumental . . . the best graphic package . . . the last word" TURBO TOOLKIT "Excellent . . . comprehensive" SPRITE GENERATOR "Excellent . . . invaluable" SUPER ASTROLOGER "Excellent . . . strongly recommended" BETTER BASIC "Intelligent . . . excellent . . . an absolute must 5 stars" BACKGAMMON "Brilliant" DROIDZONE "Mind-numbing" BLOCKLANDS "Addictive" ARCADIA "We flipped over it"



MICROBRIDGE is a Contract Bridge tutor and playing program. It provides a new and exciting method of learning and practising bridge. Alternatively, it can be used purely for entertainment. Short of three intelligent players? Never again! **MICROBRIDGE** teaches bidding by a series of lessons and examples, and provides a virtually unlimited number (in the millions!) of randomly generated deals for further practice. **MICROBRIDGE** constructs detailed commentary on all these deals, showing (if you wish) the method for arriving at every bid. It also sets out what inference is to be drawn from each bid by the other players. The program is hence able to reproduce the thought processes of a very strong bridge player during bidding.

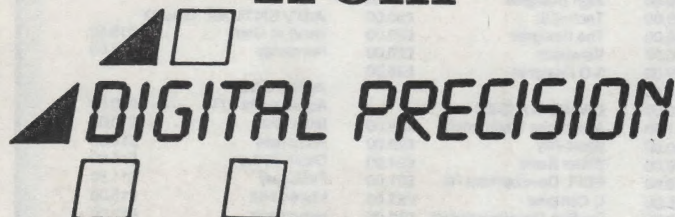
You are allowed to make any legal bid, of course – **MICROBRIDGE** may then comment on it. Alternatively, the program will bid for you and/or for your partner should you so wish. When you arrive at a contract, you take over as declarer and play the hand through. The computer will then play the hidden hands and will do its best to defeat the contract!

MICROBRIDGE knows the ACOL system, and follows the Stayman and Blackwood conventions. The manual that is supplied is both comprehensive and instructive; it does assume a knowledge of the basic rules of Bridge.

MICROBRIDGE will run on any QL with at least 256k RAM expansion and a disk drive.

MICROBRIDGE costs £34.95 complete.

The Best QL software from



ORDER FORM

To: DP, 222 The Avenue, London E4 9SE (or use the Credit Card hotline 01-527 5493)

- ☐ SPECIAL DESKTOP PUBLISHER + SPECIAL EDITOR + EYE-Q £139.95
- ☐ SPECIAL DESKTOP PUBLISHER + SPECIAL EDITOR £119.95
- ☐ SPECIAL DESKTOP PUBLISHER + EYE-Q £104.95
- ☐ SPECIAL DESKTOP PUBLISHER (MIN 512K QL + DISK DRIVE) £79.95
- ☐ TURBO BASIC COMPILER SPECIAL EDITION V2.0 + TOOLKIT £99.95
- ☐ PROFESSIONAL ASTROLOGER WITH ASTRONOMER V1.5 £69.95
- ☐ PROFESSIONAL ASTROLOGER V1.5 £59.95
- ☐ ORDINARY DESKTOP PUBLISHER (MIN 256K QL) £59.95
- ☐ SUPERCHARGE V1.19 BASIC COMPILER £49.95
- ☐ SUPER MEDIA MANAGER V1.12 £39.95
- ☐ THE EDITOR SPECIAL EDITION V2.0 (EXPANDED QL) £49.95
- ☐ SUPERFORTH WITH REVERSI V2.0 £39.95
- ☐ EYE-Q (MOUSE VERSION) V2.1 £34.95
- ☐ MICROBRIDGE £34.95
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- ☐ SUPER SPRITE GENERATOR V4.0 £29.95
- ☐ TURBO TOOLKIT V2.0 £29.95
- ☐ THE EDITOR V1.17 £29.95

- ☐ SUPER ASTROLOGER V1.5 £24.95
- ☐ CARTRIDGE MEDIA MANAGER V1.12 £24.95
- ☐ BETTER BASIC EXPERT SYSTEM V2.0 £24.95
- ☐ ULTRAPRINT (24 MODE PRINTER DUMP) £19.95
- ☐ SUPER MONITOR DISASSEMBLER V3.5 £18.95
- ☐ SUPER BACKGAMMON V3.0 £12.95
- ☐ PROFESSIONAL ASTRONOMER V1.5 £29.95
- ☐ DROIDZONE £9.95
- ☐ BLOCKLANDS £9.95
- ☐ REVERSI V2.0 £9.95
- ☐ ARCADIA £9.95
- ☐ DELUXE ATARI-ST TYPE QL MOUSE £59.95
- ☐ GIGASOUND 3 CHANNEL SOUND BOARD £69.95
- ☐ TRUMPCARD 896K(!!) INTERFACE WITH RAMDISK, TOOLKIT & FREE DP SOFTWARE £189.95
- ☐ AS ABOVE, WITH DUAL NEC DSDD 3½" DRIVES £404.95
- ☐ (£100 Trade in allowance on 512k Sandy SuperQboard – Phone for part exchange offers on other hardware)
- ☐ ALL 5 DIGITAL PRECISION GAMES £39.95
- ☐ SPELLING CHECKER FOR EDITOR + OUIII £29.95
- ☐ CHEAP CARTRIDGES – BATCH OF 20, BOUGHT AT THE SAME TIME AS DP SOFTWARE £25.00

• UK delivery costs are all-inclusive, Europe and 5%, elsewhere 10% to cover airmail costs.
• Program upgrades can be obtained by sending us the original cartridge (NOT the packaging or documentation) plus £10 (£12 Europe, £15 elsewhere).

Name: Address:

Post Code:

☐ Cheque/Cash/PO ☐ Access/Mastercard ☐ Visa/Trustcard/Barclaycard for £

Card Number: Expiry Date: ☐ Cartridge ☐ 3½" disk ☐ 5¼" disk

SQL11

COMPUTERS

QL JS 2.3 software	£169
QL640 JS 2.3 software	£260
Organiser XP 32K	£138
Organiser CM	£99

EXPANSION BOARDS

512K Miracle Expanderam	£99
512K Internal upgrade	£94
512K SQB & Mouse	£287
768K Trump Card	£199
Eprom expansion board	£68

MONITORS

Philips 7502 + lead green	£98.00
Philips 7522 + lead amber	£102.00
Philips monitor stand	£12.00
Microvitec DQ3 colour	£260.00
Microvitec tilt/swivel stand	£25.00

TK

COMPUTERWARE

the QL stockist

Tel: 0303-81-2801

DISC SYSTEMS

Dual 3.5 in. + Trump Card	£350.00
Single D/D 3.5in. drive	£125.00
Single D/D 3.5 in. & 0K SQB	£225.00
Dual D/D 3.5 in drive	£209.00
Dual D/D 3.5 in. & i/face	£295.00
Dual 3.5 in. & 512K SQB	£350.00
Cumana disc interface	£ 86.25
768K Trump Card	£199.00

SPARES

JS ROM sets	£27.50
Keyboard membrane	£6.25
Keyboard bubble mat	£3.85
ULA ZX 8301	£9.50
ULA ZX 8302	£10.25
MAB 8049	£7.50
CPU 68008	£25.80
M/drive assemblies- complete	£27.50
Voltage regulator (high output)	£4.75
Power supply UK	£23.50
Power supply European	£25.50

SUNDRIES

10 Microdrive cartridges	£17.50
Cartridge storage box	£5.50
QL Dustcover	£5.00
Psion 2.3 sets	£10.00
Psion 2.35 sets	£20.00
Eprom Programmer	£129.00
Battery clock kits	£19.50
10 DS/DD discs 3.5"	£18.50
10 DS/DD disks 3.5"	
(branded)	£31.50
Centronics Interface	£19.50

SOFTWARE

BUSINESS

Flashback	phone	£15.00
Cash Trader (PDQL)		£80.00
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Decision Maker		£35.00
Entrepreneur		£35.00
Finance Manager		£19.00
Home Finance (Buzz)		£22.00
Investment Monitor		£20.00
Project Planner		£29.00
Small Traders Pack		£25.00
Spellbound (c-d)		£30.00
Spellbound + Filebound		£35.00
Touch Typist		£12.00
Pacioli		£25.00

UTILITIES

Archivist		£30.00
Cartridge Doctor		£13.00
Copymate		£11.00
CPM Emulator (c-d)		£45.00
Assembly Lang. Toolkit		£25.00
Desktop Publisher		£60.00
Desktop Publisher		
- S/Editor (d)		£80.00
Front Page (c-d)		£23.00
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QLibrator (c-d)		£60.00
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QWriter 2		£20.00
Task Master		£25.00
Task Master (d)		£25.00
The Editor		£29.00
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TechniQL		£50.00
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Super Astrologer		£25.00
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Squadron		£16.00
Super Backgammon 3		£13.00
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2 Stalingrad		£13.50
3 Destr. of Army Group		£13.50
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Horrorday		£15.00

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Fictionary		£11.50
Hoverzone		£15.00
Hyperdrive		£13.00
Jungle Eddi		£15.00
Karate		£15.00
Knight Flight		£15.00
Mortville Manor		£20.00
Quboids		£9.00
Stone Raider		£13.00
Tank Busters		£15.00

BOOKS

Adv. User Guide	£15	QL Service Manual	£20
Assembly Lang.		Technical Guide	£20
Programming	£9	Other QL titles available,	
QDOS Companion	£7	- phone for details -	

Z88

Z88 + mains adapt.	£297.50
32K Rampack	£20
128K Rampack	£50
QL- Z88 link	£23

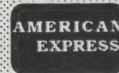
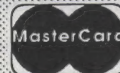
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Roulette mistake

Another minor mishap. A section of lines was missed from the magazine listing. The missing lines ran from 5480 to 6070 and are:

```
5470 AT#4;a+1,23-LEN(cnt(a)):PRINT#4;cnt(a)
5480 END FOR a
5490 elegir_numero
5500 verificar_apuestas
5510 actualizar_fondos
5520 PRINT#6;t3$
5530 IF numero=0
5540 FOR k=1 TO 6
5550 val(ord(k),k)=0
5560 ord(k)=ord(k)-2
5570 END FOR k
5580 FOR q=1 TO 6
5590 FOR nom=1 TO ord(q):val(nom,q)=val(nom+1,q)
5600 END FOR q
5610 END IF
5620 FOR g=1 TO 6
5630 IF gan(g)>0 AND numero>0
5640 ord(g)=ord(g)+1
5650 ord(7-g)=ord(7-g)-2
5660 val(ord(g),g)=cnt(g)
5670 FOR u=1 TO ord(7-g):val(u,7-g)=val(u+1,7-g)
5680 END IF
5690 END FOR g
5700 cambiar 4
5710 IF ett=1:texto_4
5720 PRINT#6;t19$
5730 borrar_variables
5740 IF banc<=0:EXIT proceso
5750 END REPEAT proceso
5760 reiniciar
5770 END DEFine
5780 :
5790 DEFine PROCedure empezar_serie (a)
5800 FOR s=1 TO 4:val(s,a)=s:ord(a)=4
5810 END DEFine
5820 :
5830 DEFine PROCedure reiniciar
5840 IF fdon<=0:PRINT#8;t13$
5850 IF banc<=0:PRINT#8;t14$
5860 IF NOT hay_fondos:PRINT#8;t16$
5870 PRINT#9;t15$:CLS#6
5880 aviso:PAUSE 100
5890 borrar_variables
5900 texto_4b
5910 IF fdon<=0:cantidad_jugador
5920 IF banc<=0:cantidad_banca
5930 IF NOT hay_fondos:cantidad_jugador
5940 PRINT#8;ta$:PRINT#9;tb$
5950 iniciar_juego
5960 END DEFine
5970 :
5980 DEFine PROCedure aviso
5990 BEEP 1600,70
6000 END DEFine
6010 :
6020 DEFine PROCedure resultado
6030 IF numero=0
6040 FOR r=11 TO 13:AT r,30:PRINT
6050 ELSE
6060 FOR rs=1 TO numero
6070 IF rs=1 OR rs=19:RESTORE 2430
6080 READ res
```

Ultrasoft reappears

Not immune to the usual upheavals generated by major company re-organisation, supplies of the programs from Ultrasoft are now making their way back on to the market.

Qkick, with which Ultrasoft made its debut into the

QL market, has been vastly expanded to the current version 3.6 and is now fully-compatible with the Qjump *QRAM*. The majority of the standard Ultrasoft titles must be obtained directly from Germany until such time as a U.K. agent has

been appointed.

Other Programs available from Ultrasoft include Tool-box II, Q-Writer v1.17, Graphic Construction Kit, Full House, Arcanoid, Double Ion and Gold Ion, and Q-Fonts I for use with Q-Writer.

Faster and Faster

Simon Goodwin, author of the SuperCharge and Turbo compilers, aims to make the QL faster still. His latest product, *SpeedScreen*, is a general-purpose utility designed to increase screen output speed in Mode 4 by anything up to 10 times normal. The exact speed increase factor depends on the CSIZE, INK, PAPER, OVER and UNDER being used when printing text. Speed increases have also been achieved on scrolling and even clearing the screen.

Not all screen output will show an improvement. There has been no attempt to alter Mode 8 output, or CSIZES other than 0,0 and 1,0. They are the sizes used by most commercial programs, including the Psion packages, so it is still a very worthwhile product.

In addition to re-writing the appropriate display routines a number of new features have been added. There is now a new speedy CSIZE between 0,0 and 1,0, and a condensed size. User-defined graphics are also available from SuperBasic on an 8 x 9 grid, giving much more attractive characters. A library of new fonts is supplied with the tape and disc versions.

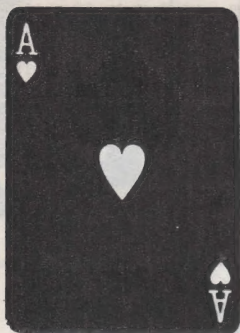
SpeedScreen retails for £20 cartridge or disc or £30

ROM. It will also be available built into expansion systems from several major QL manufacturers.

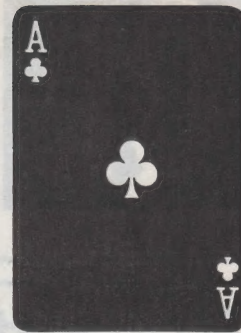
We will be examining the package in detail next month. Further information can be obtained from Creative CodeWorks, 120 Greenfield Road, Harborne, Birmingham B17 0EG.

New Schon keyboard is now available

After overcoming considerable production difficulties, supplies of the new Schon separate keyboard are now finding their way into users' hands. More reminiscent of a PC than the traditional QL key layout, the Schon top-of-the-range 76-key keyboard includes 10 function keys, a numerical keypad and several genuinely useful functionally-combined keys exceptional to the operation of the QL. Eight cursor keys are provided for horizontal, vertical and diagonal movement of the screen cursor.

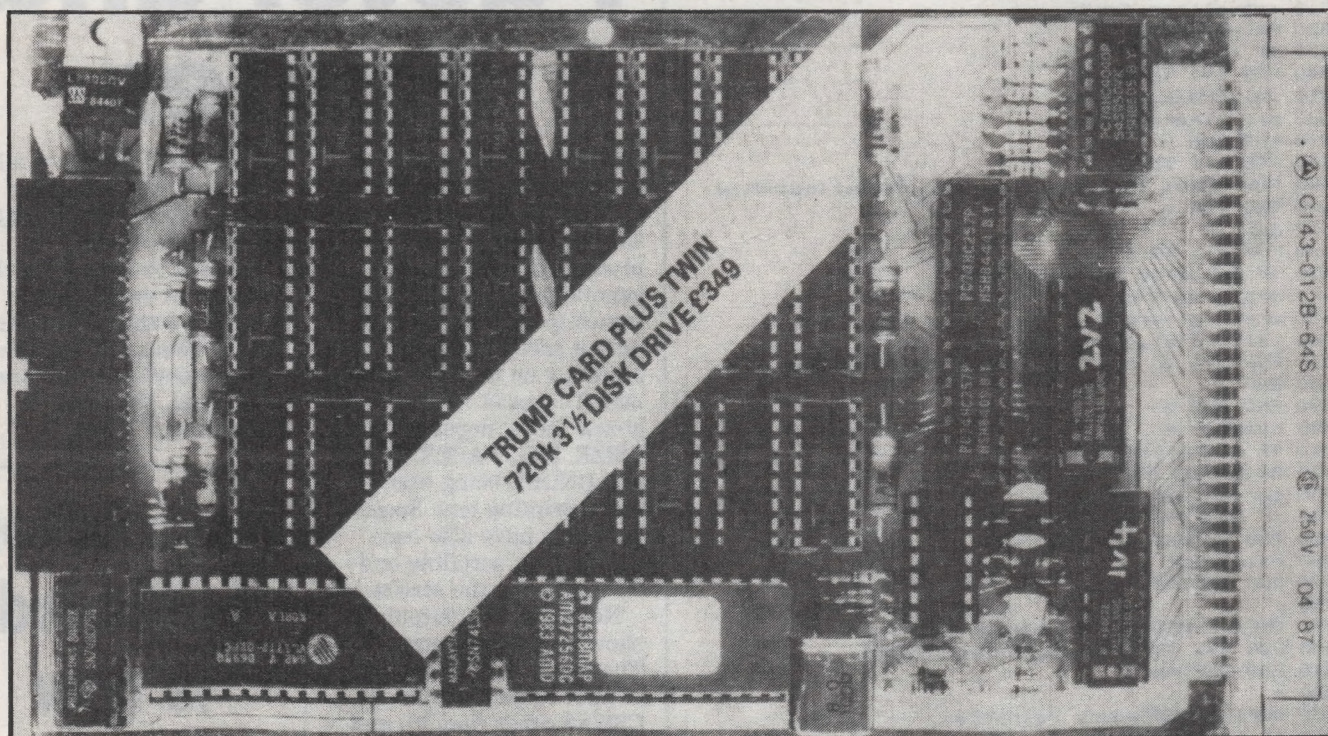


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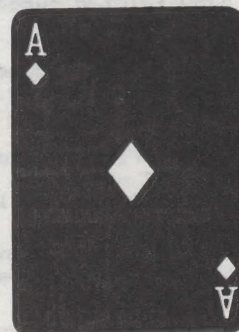
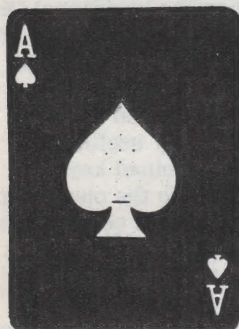
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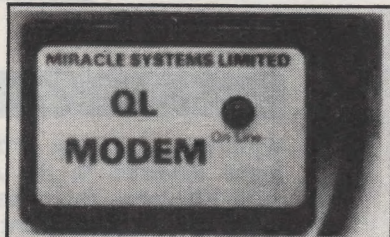
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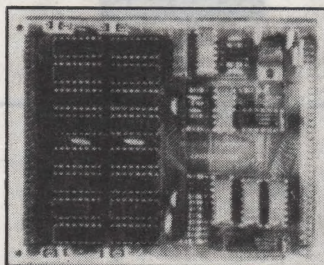
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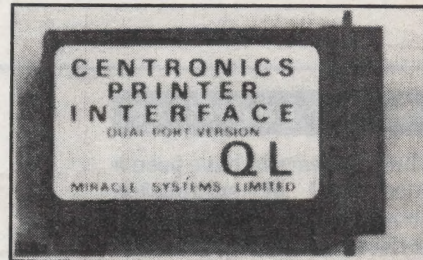
- ★ 1200/75 e.g. PRESTEL, T/GOLD
- ★ Autodial
- ★ 3 metre cable
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- ★ Not BT approved

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- ★ Can speed up some programs
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- ★ Standard Centronics plug
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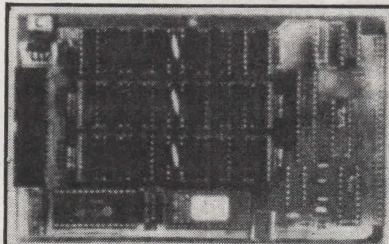
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★ New printout software



- ★ Interfaces QL to standard modem
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Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

OPEN

Simple protection

There appears to have been a good deal of speculation about ways of protecting SuperBasic programs from tampering. I have devised an easy method of doing it by re-defining the editing codes as follows:

Example:

```
10000 DEFine PROCedure LIST
10010 NEW
10020 END DEFine
10030 DEFine PROCedure EDIT
10040 NEW
10050 END DEFine
10060 DEFine PROCedure AUTO
10070 NEW
10080 END DEFine
```

Any attempt to use these keywords will then cause the program to NEW itself. Simple solutions are often the best. I hope this will help fellow QL users in protecting their work.

Colin Holland,
Chertsey,
Surrey.

JS upgrade

With regard to the article *Roms Revealed* in the August, 1987 issue, there seems to be a misleading point. It states that JM software was the first to fit into two chips. My AH version QL was on two ROMs before I upgraded it successfully to JS with no difficulty. I think that information would be more useful to Christos Koutsoupas - August, 1987, Open Channel - who enquired about the upgrade. He may have a ROM version AH rather than the earlier EPROM version.

Alastair Wright,
Chryston,
Glasgow.

The QL world

First let me congratulate you for the excellent magazine you are running. Also if the rumours that you are running it with five QLs are true, let me congratulate you again. My firm belief is that instead of thinking only about themselves, software and hardware houses should work together. I am convinced that if goals were to be set and everybody worked towards them, perhaps we might still make the QL recognised by everyone as the great machine it is.

Despite this pessimistic outlook on the QL market I am happy to see that more and more programmers writing QL software know what they are doing.

The quality of products produced by certain people is such that I am astounded they have not fled to more interesting machines. I know you are saying there is nothing more interesting than the QL. In spite of being a Sinclair addict I have to admit that the Amiga is something else. Be happy I am not say-

CHANNEL

ing the same thing about the Atari ST.

Moving to another subject, I am about to finish work on a program which I would like to see printed in the magazine. My first query is whether you accept programs from overseas? Second, would you accept a program which amounts to approximately 24K and is about 900 lines long?

Jose Luis Martins,
Portugal.

Editor's reply: *We accept programs from overseas and with the new expanded Microdrive Exchange we consider much longer programs than we were previously able to do. Submissions should contain at least a Microdrive cartridge, instructions and SAE. A demonstration program, where necessary, boot file, Quill documentation and program listing are also helpful.*

Our turnaround of program submissions is now down to less than two months, by which time you will either receive an acceptance form confirming our rates of pay and plans for your program or a letter explaining why we are unable to publish the program. That may be because we have already accepted a similar program, or we may feel that your program is too specialised, or we may suggest a number of improvements before re-submission.

Faster than a bullet

I do not know how many read that huge monthly tome, *Byte*, but if you have the August, 1987 issue and turn to page 245, the following might be of interest.

The article was about testing new versions of TurboBa-

sic and QuickBasic for PC compatibles and was based on one benchmark program which loaded and manipulated arrays. Needless to say, with my trusty three-year-old QL I set to work entering, optimising to use integer loops and then compiling, using a very old version of SuperCharge. The result? Without "in line" code, 3:58 and with 2:52. what does this mean?

It means the QL was 2.7 times faster than a Zenith Z-181 portable, 2.6 times faster than a true-blue PC, and even held its own against an 80386 CompuAdd machine with fast RAM, say a 256K QL giving up to 50 percent speed increases and a late version of Turbo. Could we hope for 1:00 results from the QL? If so it would beat everything else in the test other than a full-blown 386 machine and the ones with 80287 maths co-processors.

Did we not know it all along? The QL beats the PCs again. How much extra equipment could you get for the QL with the price difference? We cannot wait for OS/2 or MS-DOS V.5 for PCs. Do not tell anyone but I heard that it might include multitasking. How exciting and innovative - just like the QL.

Danny Ross,
Basingstoke.

Speedy QL?

Curiously compels me to write concerning the alleged slowness of the QL, which some seem to find cause for complaint. I run a program regularly, about 5K long, in which the computer has to operate on a selection from 33K of data and carry-out about 900 arithmetical operations, the majority in floating point arithmetic, and print the results as about 270 characters on the screen. This op-

eration takes approximately 7.9 seconds.

In addition, my JM version will find prime numbers in the 10 range in seven seconds or less and will factorise any other numbers in the same range in less than two seconds. It will also calculate 300 factorial in less than one second to normal computer accuracy.

To satisfy my curiosity, what do people want to do with the QL which they find slow?

L G L Unstead-Joss,
Edinburgh.

Micro-Fair loneliness

I was disappointed to find that the *QL World* stand at the recent Micro-Fair was manned by non-editorial staff, as I thought it would be a great attraction to have people who could be approached with queries; people to whom one could talk and feel to be old friends even though they had not met previously. I hope you might give consideration to some of your staff and writers being present in future. It can be very lonely not having a friend and guide when one faces the brick wall of an apparently insoluble problem.

Might I also make the suggestion for a series of articles on the definition of the words of a language used so glibly by the experts but which proves to be both confusing and frustrating to the novice such as myself?

I bought my QL two years ago, after much thought, and have struggled to teach myself the rules of programming. Even two sessions at local evening classes, while it helped, failed to get far beyond the elementary stages. Translating from BBC Basic makes you think; every now and again I encounter terms

like macro or vector and searches through my collection of books do not help. They all assume that everybody knows what they mean. Sometimes there is an explanation but one needs a guide. Thank you for the monthly injection of help and encouragement.

F. Merrison,
Pinner,
Middlesex.

Editor's reply: *I must agree that it would be pleasant to man the Micro-Fair stand. Perhaps the reason we have not yet done so is that people manage to encounter the brick wall of an apparently insoluble problem and expect us to solve it.*

Everybody knows that Micro is a new type of oven and Vector is a car. Seriously, though, we try to cater for all levels of experience. As with any technical subject, some people find the jargon beyond them and others will wonder why we do not cover more advanced topics.

Control II boards

I have enjoyed reading the *Connexions* page. In the August, 1987 edition you describe the Qontrol II interface board. I would like to buy one.

Unfortunately you do mention how to obtain one. Could you please let me know how?

Andrew Price,
Stocksfield,
Northumberland.

Editor's reply: *The Qontrol II interface board is available from Care Electronics, 800 St Albans Road, Garston, Watford, Herts WD2 6NL. Tel 0923 672102. The board will sell for £78.22 plus VAT, with £2 plus VAT post and packing.*

Ron Massey looks at
current state of the art
QL mice systems

Of Mice and QLs

Although the keyboard still reigns supreme as the most practical and popular device for inserting data into a computer, alternative and usually supplementary devices are in continual development which, with varying degrees of success, have been built round special purposes such as graphics, manipulating complex data or menus, or games applications.

There are at present four alternative and largely interchangeable input devices, with a number of minor sub-variations, available to the QL user — the joystick, the lightpen, the graphics tablet and the mouse.

Joysticks were one of the first types of external device intended to complement the keyboard and, at the same time, speed screen handling. Although much of their use with home computers is found with games applications, a joystick has other more serious uses where virtually any type of program requires manipulation of screen information.

Joysticks

In common with other similar devices, joysticks have a zero or home position when at rest. Movements from this position are translated by the interface into relative vertical, horizontal or diagonal changes on the screen display.

Most joysticks include one or more fire buttons which are analogous to pressing «SPACE» or other key combinations on the keyboard and, depending on the program with which they are used, allow direct user interaction with program flow or selection.

The second type of device, the lightpen, is a type of electronic stylus, not unlike a normal ink pen, connected to a computer through a suitable interface, and is used for pointing to and interacting optionally with specific areas of the image displayed directly on a monitor screen.

A screen cursor or leading pixel, in a succession of pixels, is synchronised to the movement of the pen on the surface of the monitor screen. In effect, the user is drawing directly on to the surface of the screen.

Third in the list of alternative devices, graphics tablets share a functional similarity to lightpens and are used in much the same way, except

that interaction with the screen display occurs remotely from the computer and monitor. Like the lightpen, a graphics tablet has an integral stylus which is used to point to selected areas on the tablet and may include overlays for tracing or a printed form of menu. The position of the screen cursor or pixel is synchronised electronically to the position and movement of the stylus through its interface.

Sensing elements

In appearance, graphics tablets vary largely with the application for which they are intended but usually consist of a hard plastic card and are commonly available in a range of sizes from A5 to A3.

Sensing elements built-in or bonded to the surface of the tablet detect the position, in terms of x/y co-ordinates, of the stylus. Resolution, the amount of stylus movement required to affect pixel movement, depends largely on the quality of the tablet and the purpose for which it is intended.

The mouse, as an alternative device to the use of the cursor keys, first gained major popularity for home and business applications when the Apple Macintosh, with its now almost industry-standard GEM front-end and mouse command access, was released a few years ago.

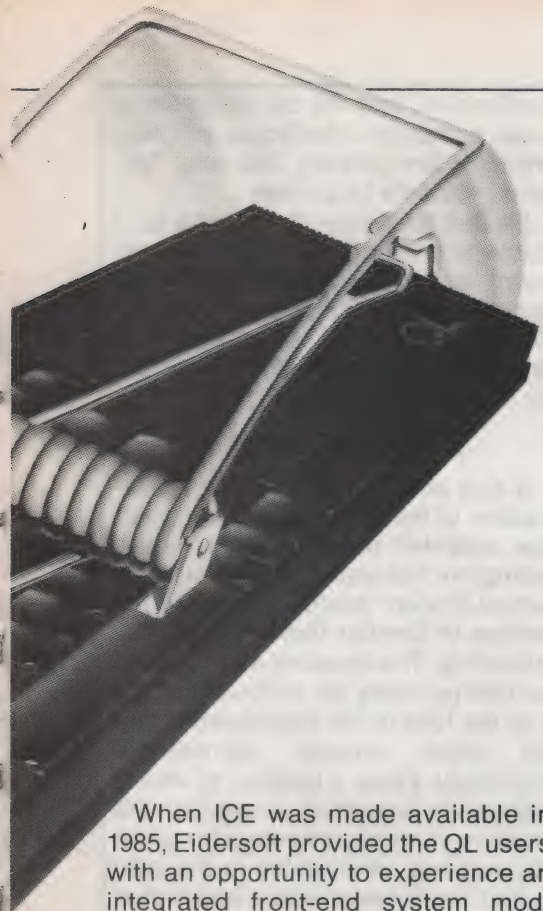
While the internal structure of a mouse varies slightly with each brand, mice consist of a small plastic box and include one or more buttons on the upper surface for the input of commands. A ball, protruding slightly through the base of the mouse, is in constant contact with the table on which it is placed and movement of the mouse within its workspace causes the ball to rotate.

Two internally-mounted perforated discs, coupled to the ball by a friction clutch and separated by 90 degrees, representing the x/y axis, convert light from LEDs into pulses, detecting horizontal and vertical movement which, in turn, is translated by the mouse interface into screen position of a cursor.

In terms of speed of operation, where a screen cursor is used to select from complex menus or when used for freehand drawing applications, a mouse is difficult to equal.

At present there are four brands of mouse available for the QL. The first to make its appearance was the Eidersoft Mice system, released soon, after its EPROM-based ICE front-end.





When ICE was made available in 1985, Eidersoft provided the QL users with an opportunity to experience an integrated front-end system modelled after the front-end supplied as standard with the Macintosh, a system which the majority of computer manufacturers world-wide have tended to emulate ever since.

The standard version of ICE relies on pressing a combination of cursor keys to effect movement of a screen pointer which, in turn, accesses the system commands. Command selection is made by either a single or double pressing of the «SPACE» bar.

The Eidersoft mouse system includes EPROM-based ICE and connects to the QL through the ROM port. Command selection is made by pressing one of the three mouse buttons.

Ice system

Shortly after its mouse system, Eidersoft released its graphics program, ArtICE. As a graphics system it is innovative and includes a number of useful features for effective graphic arts. All menus are mouse-accessed and selection from each of the menus, as with the drawing process, occurs by moving the mouse over an area of adjacent work-table space and pressing one of its buttons.

The French-based software company, Pyramide, has produced a particularly versatile graphics program, *QL Designer*, one of the few programs which users can elect to use optionally either with the Eidersoft mouse system or cursor keys to control the screen when the program is configured to run a particular system.

The ABC mouse system was released to complement its Giga Desk front-end and Gigachrome graphics program systems, both of which have been reviewed in Utility File. While the mechanical quality of the mouse is one of the best I have seen, connection of the ABC mouse to the QL includes a relatively clumsy prototype interface which occupies both the QL ROM and CTRL ports. My principal objection to the finish of this mouse system is that the wiring needed to complete the connections is rather untidy.

The first prototype of the Sandy disc interface, with an integral mouse port, made its appearance in November, 1986 at the ZX Microfair. With the differences that the prototype did not include a built-in RAM disc and incorporated a chip-packing density which needed to be seen to be appreciated, the prototype was otherwise virtually identical to the previous versions of the standard Super Q Board.

The production version of the Super Q Board and mouse system was released soon afterwards and included a number of innovative features such as a switched mode power supply and stacked PCBs, the upper one of which is a detachable 512K memory board. Code for the mouse driver originates from QJump and is one of the smoothest I have had on my test bench.

Limited access

One of the more common criticisms of the QL is that it is very easy to fill the two access ports by the many add-ons available. Largely correcting this deficiency, and leaving the expansion ports available for other peripherals, QIMI, the QJump mouse interface, is fitted internally, directly to the QL main PCB.

Displacing the upper ROM-marked QL-JM or JS8000 – and the ZX8302 chips, the interface PCB is a very neat example of well-planned add-on engineering. Installation is intended as a DIY project and all the required tools – a particularly useful miniature tool for extracting chips from the QLs main PCB and a cross-point screw driver, are included; no soldering is required. The instructions provided are clear, concise and unambiguous.

Considerable thought has gone into the QIMI miniaturised layout; the shape of the PCB allows additional internal peripherals, such as the majority of the internal memory upgrades, to be used in conjunction with its installation. The mouse connection is made to a small ribbon cable, wired to the QIMI PCB, exiting

through the rear of the QL which terminates in a multi-pin plug.

Much of the compact design of the interface can be attributed to the use of surface-mounted integrated circuits rather than the more usual plug-in types of IC which occupy about four times the area.

The two resistors mounted above the 8302, known as modification "G", required for improving the reliability of Microdrives, can be removed from the QL completely as they have been incorporated into the QIMI interface.

Installation of the QIMI interface is simple but extreme care must be taken at two stages – the chips displaced by the interface are very sensitive to static electricity and can easily be destroyed. If you have carpets or clothing which include man-made fibre, it is a good idea to avoid moving around until the installation is completed.

Interfaces

The other precaution concerns the pins located on both the bottom of the interface and on the integrated circuits. While the connecting pins are not particularly fragile, bending one or more of them without realising you have done so is fairly easy to do.

The new socket into which the mouse connects exits through one of the existing QL ports – over the serial 2 port. Alternatively, the more adventurous may consider cutting the QL housing carefully and providing a separate exit for the connector and mounting the mouse socket in line with other QL connectors.

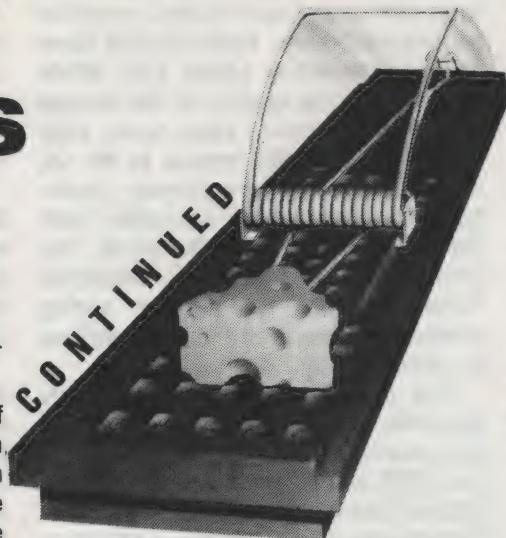
Still relatively rare in the U.K., the single-button Star mouse originates in Spain from Puricorp and connects to the QL via the ROM and CTRL ports. The only program available at present for use with the Star mouse is a rather interesting graphics program. Although it incorporates a number of useful features, the documentation supplied with the review copy was entirely in Spanish.

Curiously, manufacturers of new computer systems seem to feel that the inclusion of a mouse as a standard feature is almost mandatory. As a consequence, programs on the Amiga and ST, to name two such systems, seem to delight in requiring that the user integrates the use of the mouse into programs for all command access.

Mice are particularly useful for freehand drawing. Where I dislike the use of mice is for applications such as word processing, where there is a mandatory mixture of using the keyboard for



Of Mice and QLs



character input, and the mouse for accessing the command menus.

One of the principal limitations of QL mice is that very little has been done to provide the general user with a simple means of utilising mouse code with programs other than those released commercially. Also the various mouse systems available for the QL are not interchangeable.

Compatability

If you wish to use a mouse with your programs, interfacing the Sandy/QJump system has been implemented by the author of *QWriter* and *QWriter II* with the *Writer and Pointer Toolkit* reviewed in the October Utility File.

This particularly useful toolkit provides SuperBasic extensions, allowing users to write their own systems for either graphics programs or command menus and optionally utilises the QRAM non-destructive windowing routines.

Software houses have been generally remiss in providing users with programs on general release with which a mouse may be used with their systems. The mouse compatibility line-up is:

Eidesoft: ICE front end, ArtICE and Pyramide QL Designer.

Sandy/QJump: QRAM, Datalink CADPAK, and Writer and Pointer Toolkit.

Star: Puricorp dedicated graphics program.

ABC: Gigachrome and Gigadesk.

To date, only the Sandy/QJump mouse system can be interfaced easily to user-originated SuperBasic programs and only by including the extensions provided by the Pointer Toolkit. It is rather surprising that, where applications of the mice available for the QL have emulated the popular GEM/Macintosh front-end/command access systems, with the exception of the QJump QRAM they all share the common fault of not including some method of software adjustment of the ratio of mouse to screen cursor movement.

Having fixed ratios of movement can result in requiring either too much table space for the mouse or a mouse which is too sensitive to positional movement.

It is equally surprising that manufacturers have not adapted existing technology to produce either a dedicated QL graphics tablet or a lightpen, for which there would be an undoubted demand. In some ways, graphics tablets are somewhat more specialised than the other devices dealt with in this report but are generally more versatile.

Future of mice

Technological trends indicate that there will be amazing developments in the area of computer interfacing in the next few years. A number of manufacturers are making serious attempts at developing vocal interfacing and the ramifications of such a system, when it eventually makes its appearance, are truly mind-boggling.

Some computer-literate sociologists feel that vocal interaction will go a long way to redress the often-lamented lack of social communication. Others feel, with probable

justification, that the development of vocal computer interfacing will only enhance the already dramatic tendency towards jargonese.

Be that as it may, the search for a viable alternative to the humble keyboard for interfacing the user to the computer is a continuing process. Undoubtedly vocal interfacing will reap tremendous benefits for particular applications.

Available options

It may possibly be true that the attraction of the computer for the average potential user, as experienced during the halcyon days of a succession of Sinclair machines prior to the demise of Sinclair Research, is diminishing. The reasons are complex but can probably be attributed largely to the loss of the charismatic symbol which Sinclair represented admirably. Once a method of verbal interaction becomes available, the massive sales of computers for home applications, attributable in the past to Sir Clive's imagination, will probably be re-kindled.

In the meantime, whether or not you feel the addition of a mouse to your QL operating system is a worthwhile investment will depend largely on your particular requirements.

Some types of commercially-available programs, such as ICE and QRAM, are genuinely enhanced by the availability of a mouse. The majority of the more sophisticated general-purpose graphics programs include a facility for airbrush/spray painting; at least one provides a routine which, where a mouse is available, users can make small modifications to the configuration of the main program so that it is mouse-compatible.

Where business programs employ complex menu systems a mouse is invaluable for improving speed of program operation. A mouse, in common with any other type of computer peripheral, is only as helpful as its user makes it.

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Product: Qjump Mouse Interface	Price: £69.95
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Product: ABC Mouse	Price: £85.95
Source: ABC Elektronik, Hugelstrabe, 10-12 48 Biellefeld 1, West Germany. Tel: 010 49 521 8980881	
Product: Star Mouse	Price: £49.95
Source: Puricorp, Calnuevas 4, 19001 Guadalajara, Spain. Tel: 911 21 23 58	

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Sinclair QDOS Companion

The QDOS Companion by Andrew Pennell, One of the most prolific authors on the QL, is essential reading if you are interested in programming you QL in machine code. Covering all the functions of QDOS, giving full information on how to use the TRAPS, and VECTOR calls. It includes details on how to access the keyboard, screen, serial ports all from machine code, plus how to write multi-tasking programmes, and how to get the 8049 co-processor to work for you in your programmes. All this and much more £6.95
Also from the same author: Assembly Language Programming on the QL .. £7.95

QL Service Manual

The QL Service Manual is the book issued by Sinclair Research to QL repair companies. It contains all you need to know about the QL hardware, complete with a full quota of circuit diagrams, block diagrams and details on various chips and their function. Diagrams cover the Microdrives, the main circuit board and power supply to all relevant areas. Ideal for fault finding or for 'dabblers' wanting to modify certain areas.

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SpellBound is an on-line spelling checker introduced by Sector Software. It can work with any program which requires text input. That includes the obvious programs such as Quill and Editor and also the less obvious ones such as Super-Basic. The program works by monitoring the keyboard input and comparing 'words' against its dictionary.

Various levels of interference may be specified by the user, so that *SpellBound* may remark on a 'new' word which of course may be an error in one of several ways, ranging from a discreet bleep, through putting a mark in the text, to disabling the entry of mis-spellings.

Esoteric words

There are several instances when you want the checker to be able to do more than that. We all have our own favourite esoteric words and language structures. So it would be convenient to have an automatic way of personalising your dictionary to teach it the less common words you use.

Sometimes it is convenient to work in 'modes', sticking to doing one thing at a time. An example in the case of document creation might be first to put together some text, forged in the white heat of creativity, and only later, when the muse has passed on, to worry about layout, spelling and so on. This type of approach is contrary to the idea of on-line spelling checking, since the opportunity for *SpellBound* to monitor the text is limited to what is being typed now.

Filebound

So an off-line mechanism is required which does the checking against the same dictionary and ideally to the same conventions as the original. The program *FileBound* was written to provide this facility. A listing of *FileBound* is included in *The Progs* and the purpose of this article is to describe how the program works. The program application will have some interest for *SpellBound* users but the program might also offer some interesting points for a wider group.

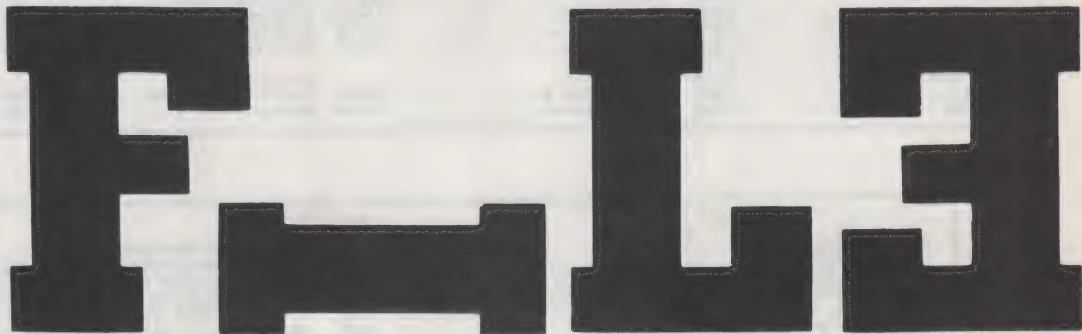
In principle, *FileBound* is a simple extension of the

SpellBound idea. *SpellBound* steals the keyboard from the program which currently has it, analyses the keyboard input as it occurs and then passes on the keyboard data, plus any commentary from *SpellBound*, to the host program — Quill or Editor or whatever.

All that happens without

which has been "errored" by *SpellBound*. It could be a file on disc, RAM or tape, or the screen — scr — or perhaps the printer — ser or par. Conversely, the program may be run in teaching mode, where it is assumed that the input file has no spelling mistakes and any new words are to be added to the dictionary. In

character from the keyboard. "sv keyq" is a pointer to the current keyboard 'queue', the list into which characters from the program which owns the queue. "io qin" is the address which holds the address of a routine in the QL ROM which places a new character into a queue; this routine address is moved into



Chas Dillon casts an expert eye over the program Filebound and explains how it works

the host program being aware that anything has changed. *FileBound* works in a similar way. It forces *SpellBound* to steal the keyboard from *FileBound*, then goes to see which system channel has the keyboard, and thereafter simulates keyboard input into that channel by reading the data from the document file to be checked. So *SpellBound* is deceived into thinking that all the data from *FileBound* is from the keyboard. The output from *SpellBound* is passed to *FileBound* in the usual way and *FileBound* writes it to the new document file.

The program takes as input either a straight text file, which is simple, or a Quill document file, which is not. Quill document files have much control information in them, with pointers to specific character positions in the file. If any characters are inserted into the file all the relevant pointers have to be adjusted or Quill will not be able to make sense of the amended file.

The output from the program depends on some start-up options. The program may be run as a straight check on a file, in which case a revised document file will be written. Optionally, another file, the listing file, may be specified, to which is written any word

this mode, as a precaution, *FileBound* always produces a listing file.

After *FileBound* has completed it will display the number of new or errored words. The output listing file may be examined, if it was set up as a file and not a device, by copying to screen or printer or by reading it into Editor or importing into Quill. The revised document file, if any, may be read into the appropriate editor and errored words may be found by scanning for the hat (" ") character. *SpellBound* uses to mark errors. Note that *SpellBound* should be running in its MODE 3, its default mode, while running with *FileBound*.

Table update

The main body of the program is simple. The only slightly complex part is the requirement to update the paragraph control table in Quill document files.

Lines 1190-1220 have some QL system variable addresses. All those addresses, and many others, are documented in standard QL works such as *The Sinclair Qdos Companion* (Andrew Pennell) and *QL Advanced User Guide* (Adrian Dickens). "sv arbuf" is the QL location which contains the latest

the variable "add to q". The Identify Files and Options routine take care of the start-up dialogue. On return from this routine, the files have been opened and control variables have been set. Channel #3 is used as the input file. If the variable "writing" is true, channel #4 is used as the output file. If the variable "list reqd" is true, channel #5 is used as the listing file.

Two other variables have been set; "teaching" is true if new words are to be added to the dictionary and "quill doc" is true if the input file is in Quill document file format. In the latter case, some other items are researched from the Quill file header, namely the length of the 'text portion' of the file and the length of the Quill paragraph control table.

As most users will know, Quill documents have their control information at the back end of the file, so *FileBound* discovers from the file prefix where the text data ends and the control data starts. The end of text pointer value is stored in the variable "quill ptr". The length of the paragraph control table is stored in the variable "para tab len" and some memory is reserved for storing updates to elements in the control table.

The program then wakes

SpellBound. SpellBound will have been started previously, using the special boot file provided with the program. This boot operation completes the loading of the dictionary and then asks what program should be loaded. At that point the boot program may be broken, using CTRL and SPACE. That leaves Spell-

as flags for underline on/off, bold on/off and the like. They are passed straight through to the output file, if any.

The program is also interested in keeping track of words. It looks for word delimiters so that if a word is errored by SpellBound the whole of the word may be added to the listing file. Clear-

If SpellBound errors the word, or the word up to the present point, it will return the hat character followed by the character sent. In checking for a hat response, the program must be careful that hat is not also what was sent.

One other circumstance has to be considered. SpellBound plays games if it sees

known Word. If in teaching mode, and SpellBound has errored the current word, when FileBound reaches the next word delimiter it will add the whole word to the dictionary. The signal to tell SpellBound to do this is CTRL and A - ASCII code 1.

When a new word occurs, SpellBound looks at the first character and, if it is a capital letter, breaks out of the current sequence and asks if the word is valid only if the initial letter is capital, for example the word London or Jennifer. Rather than stop the program and ask the user, FileBound always responds "No" to those questions, so that the word is valid in the dictionary whether it has an initial capital or not.

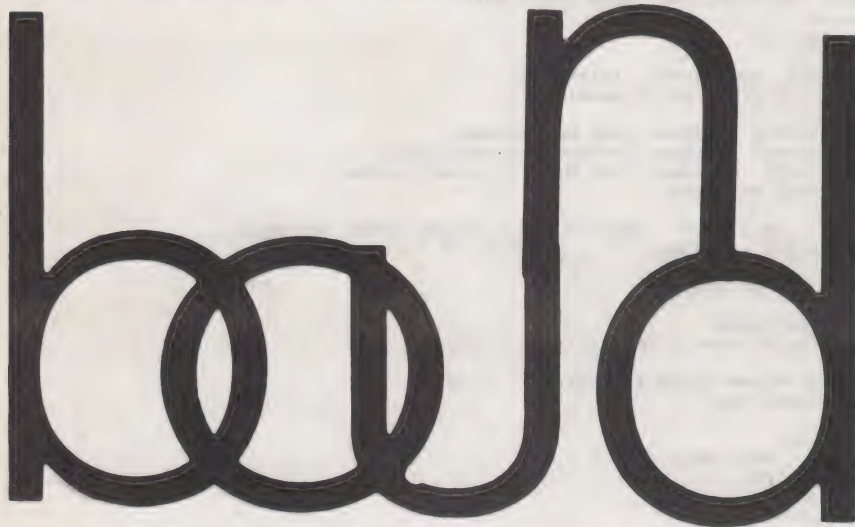
Most frequently it can be expected that a word is capitalised because it is the first word of a sentence. A similar sequence can occur if adding a word which ends in a full stop - SpellBound will ask if it is an abbreviation in which case the full stop is stored in the dictionary as part of the "word". Again, FileBound will reply "No" to the question.

There are two more routines which might hold some mysteries. They are to do with closing the Quill document file. The paragraph control table has a small prefix which indicates the size of each entry, the current table capacity, the actual number of entries and the table increment size. The entries then follow.

Each entry is 14 bytes long. The first four bytes indicate the offset from the start of file of the first character of the paragraph. The next two bytes contain the length of the paragraph. The remaining eight bytes contain information about margins, tabs and so forth, which is not affected by FileBound.

Start positions

The routine Update Paragraphs makes adjustments to the start positions and lengths, using information stored by the Put and Read routine while processing the file. The final chore for a Quill document is to update the pointer in the document file prefix which indicates the



Bound running but unattached to any program. In that state it is looking constantly at the "sv arbuf" address to see if anyone wants it.

The conventional signal to switch on is CTRL and O - letter O - which equates to ASCII code 15. FileBound pokes the trigger value into that address and then suspends itself by waiting for the response to an otherwise pointless INPUT statement.

When FileBound gets a response to the INPUT statement it does so by courtesy of SpellBound, which has by now seen the CTRL/O and stolen the keyboard. Knowing that, FileBound looks at the system variable "sv keyq" to see which keyboard queue SpellBound is using.

From then, FileBound will put all of the text from its input file into that queue, using the ROM routine pointed to by "add to q", and get all its data back from SpellBound via channel -1, the channel which owned the keyboard when SpellBound stole it.

Display flags

The main loop reads one character from the input file. If it is anything like a displayable character it is passed to SpellBound. Non-display characters are to be expected in Quill documents

ly, it cannot know ahead of time which words are incorrect, so every start of word is noted. All characters which are none of A-Z, a-z, 0-9, apostrophe and hyphen are considered to be word delimiters.

That is to conform with the SpellBound view of words. In addition to noting where the word starts, FileBound also notes if the initial letter of the word is a capital; later SpellBound may ask some questions prompted by the occurrence of a word starting with a capital letter and the program needs to be able to anticipate whether or not those questions will be asked.

Added word

On receipt of any word delimiter, the program checks if the prior word has been errored, in which case the variable "word pending" is set true and if so the word is either added to the dictionary or added to the listing file, or both or neither, depending on the status of the start-up options.

The procedure Put and Read is the central part of the program. The object of the routine is to give a character to SpellBound and to service the response. In the majority of cases it is to be expected that the character given is the character which will be returned.

its own name. If a delimiter occurs before and after the word spellbound, the response from SpellBound will be a 'left word delete' character - ASCII 198 - followed by 13 data characters, being two spaces and SPELLBOUND in capitals, followed by the delimiter sent. FileBound throws away the excess 12 characters.

If the character which has just been returned is a 'paragraph delimiter' from a Quill file, an ASCII zero FileBound has spotted previously when looking for delimiters in function Char Range and turned temporarily into an ENTER character, some information has to be stored so that the paragraph control table may be updated when it is reached.

The information stored is "how many new characters have been added to this paragraph". Those new characters are, of course, the hat error flags returned by SpellBound. Later, when the paragraph control table is being amended, the two items 'start address of paragraph' and 'length of paragraph' for each paragraph may be amended by adding the values just stored.

The other routine which needs a little explanation is the procedure Add to Dictionary, called from Check Un-



end of the text zone, which is synonymous with the start of the paragraph control table. That address has been moved back by the number of error flags added to the file. The routine to do this is Update Quill Ptr.

The last comment concerning Quill files is a waiver. It is possible, if Archive databases are a criterion, that Quill document files may contain areas of garbage. If so, the garbage will be transparent to the user, since Quill will know about it and avoid or remove the areas. This comment arises since the Quill file seems to have a "scrap control table" after the paragraph control table. The table never seems to have any entries, so it is likely that modern versions of Quill - v2.3+ - do not use it. FileBound takes no action in relation to this, or any later table. No-one using the program so far has reported any kind of problem in this area.

FileBound as a SuperBasic program leaves a little to be desired, most particularly in the area of file handling, because it has been written in "vanilla" SuperBasic to be entirely self-contained. It takes advantage of none of the popular QL extension Toolkits which would remove the rough patches of the program. Users with appropriate extra software, as in the Qjump Toolkit or the Turbo Toolkit, will be able to modify the program by using functions such as FOPEN, FOPEN, DEVICE STATUS and so forth, to avoid the program crashing if a named file cannot be found or opened. A compiled version of the program is also available from PQDL in Birmingham.

```

1000 REMark FileBound - SpellBound applied to a file - C.D. 2 Jun 86
1010 :
1020 REMark Get i/p and o/p file names
1030 :
1040 REMark Switch on SpellBound
1050 REMark Feed characters from i/p file to SpellBound's i/p channel
1060 REMark Read characters from SpellBound's o/p channel
1070 REMark Write characters to o/p file
1080 REMark If Quill file, adjust file header and paragraph control table
1090 REMark N.B. if any subsequent table needs adjusting (unlikely)
1100 REMark -- THIS PROGRAM DOES NOT DO IT --
1110 :
1120 REMark Next two lines for TURBO users only:
1130 DATA AREA 3
1140 IMPLICIT% ii, jj
1150 :
1160 DIM ipfn$(50), opfn$(50), lsfn$(50)
1170 DIM as$(200), cs$(200), prior_words$(200)
1180 :
1190 sv_arbuf = 163978 : REMark Last key pressed
1200 sv_keyq = 163916 : REMark Current keyboard queue
1210 io_qin = 14*16 : REMark "Put byte in queue" vector
1220 add_to_q = PEEK W(io_qin)
1230 :
1240 xtra_ch = 0 : in_ct = 0 : changed = 0 : beyond_quill_text = 0
1250 word_pending = 0 : lsfn$ = "" : prior_words$ = ""
1260 :
1270 Identify Files and Options
1280 :
1290 Switch on SpellBound
1300 REMark Spellbound should now have the keyboard
1310 :
1320 INPUT NTO 22;"Press ENTER to continue: ";cs$
1330 Identify Current KeyQ
1340 :
1350 REPEAT main_lp
1360 IF EOK(#3) : EXIT main_lp
1370 as$ = Next Char$
1380 IF Display_Char
1390 Put and Read (as$)
1400 ELSE
1410 IF list_reqd : Check_Unknown_Word
1420 IF beyond_quill_text
1430 Scan_Para_Table
1440 ELSE
1450 Write_Char
1460 END IF : END IF
1470 END REPEAT main_lp
1480 :
1490 CLOSE #3
1500 IF writing : CLOSE #4
1510 IF list_reqd : CLOSE #5
1520 Give to SpellBound CHR$(208) : REMark Up arrow to switch off
1530 as$ = INKEY$(#1,-1)
1540 IF quill_doc : Update_Quill_Ptr
1550 REMark RECHP table space ( or DEALLOCATE table space )
1560 PRINT "\End of Task - ";xtra_ch;" new/error words were found"
1570 IF teaching AND xtra_ch
1580 PRINT "Remember to save the new dictionary" : END IF
1590 STOP
1600 :
1610 DEFINE PROCEDURE Switch_on_SpellBound
1620 POKE W sv_arbuf, 15 : REMark CTRL/O
1630 END DEFINE
1640 :
1650 DEFINE PROCEDURE Identify_Current_KeyQ
1660 queue_ptr = PEEK L(sv_keyq)
1670 END DEFINE
1680 :
1690 DEFINE FUNCTION Next_Char$
1700 in_ct = in_ct + 1
1710 RETURN INKEY$(#3,-1)
1720 END DEFINE
1730 :
1740 DEFINE FUNCTION Display_Char
1750 char_type = Char_Range
1760 delimiter = (char_type <> 2)
1770 RETURN char_type
1780 END DEFINE
1790 :
1800 DEFINE FUNCTION Char_Range
1810 REMark Returns 0 - non-display character
1820 REMark 1 - displayable word delimiter
1830 REMark 2 - part of word
1840 IF quill_doc
1850 IF in_ct > quill_ptr : beyond_quill_text = 1 : RETURN 0
1860 END IF
1870 ii = CODE(as$)
1880 SELECT ON ii
1890 = 0 : IF NOT quill_doc : RETURN 0
1900 as$ = CHR$(10) : changed = 1 : RETURN 1
1910 = 9, 10 : RETURN 1 : REMark TAB, ENTER
1920 = 39, 45 : RETURN 2 : REMark apostrophe, hyphen
1930 = 32 TO 47 : RETURN 1
1940 = 48 TO 57 : RETURN 2 : REMark 0 to 9
1950 = 58 TO 64 : RETURN 1
1960 = 65 TO 90 : IF prior_words$ = "" : caps_set = 1

```




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The Thor Computer System is a professional business machine designed with the user and his future requirements in mind. Cambridge Systems Technology have developed several models making the Thor extremely versatile: the single NEC 3.5in. floppy version with or without a 20M SCSI Winchester in addition to the dual floppy model packaged in a stylish metal case. The Thor is equipped with 640K RAM, parallel and serial printer ports, battery-backed clock and a separate IBM style (PC-AT) keyboard. Supplied free with the Thor is a specially commissioned version of the award winning Psion Xchange(*) software suite and a comprehensive manual. Special features of the Thor include multitasking at a single key-stroke and enhanced screen windowing representing excellent value for money.

The Thor 20 Computer System is the newest development from Cambridge Systems Technology, the very latest in high-speed processing. Based on the Motorola MC68020 processor, the Thor 20 delivers on average three times the computing power of the Thor. It is available with a choice of two clock speeds: 12.5 MHz (standard) or 16.7 MHz. The Thor 20 package includes a suite of development software comprising a specially commissioned macro assembler by Talent Computer Systems and a linker by GST in addition to the Psion Xchange(*) business software together with full supporting documentation. The Thor 20 Computer System provides a substantially higher performance than the Thor at a very cost-effective price.

The Thor 21 Computer System is designed for 'number crunching' applications. Based on the 68020 processor and additionally incorporating the MC68881 floating point coprocessor, the performance of floating point operations are dramatically improved — taking only 1% of the time taken without the coprocessor. This system is essential for a wide range of scientific and engineering applications and only costs an additional £201.25 (inc VAT).

CST now offer a choice of monochrome or colour monitor suitable for use with the Thor range of computers. The Microvitec 1451/DQT 14" colour monitor includes interface lead and a tilt and swivel base. The Phillips 7502 12" monitor has a dark anti-glare screen, horizontal/vertical size adjustment, position adjustment, brightness and contrast adjustment and a foldable foot. Both of these monitors have been selected by CST from the wide array of available monitors for their superior performance and reliability when used with the Thor computer range.

The best-selling floppy disk interface is fitted with a 16K EPROM containing many 'Toolkit' extensions, and CST's Ram Drive 2. It may be used with most 3.5 or 5.25 floppy disc drives. CST's own twin slimline double sided 80 track 3.5 units being exceptional value for money, with 720K of formatted storage per drive. The Toolkit provides a wide range of SuperBASIC commands and functions designed to improve access to the powerful facilities of the QL without the need for machine-code programming. Job control is made easier, files can be used for random access, alternative character sets can be produced, 'wild cards' can be used in file operations, etc.

The Ram Drive device driver allows free memory to be used as though it were a very high speed disc, in fact the fastest such device when used with the RAM-plus. Ideally used for the storage of temporary results, or multiple screen images for animated displays, it also eases the copying of files in single disc systems. The Ram Drive can only use memory which is free, so the full advantage is only felt if the QL is equipped with additional memory. Built into QDisc 4 and Thor, the Ram Drive is also available on 3.5in. and 5.25in. floppy disc.

The CST RAM-plus unit expands the available memory of the QL to the limit of 640K. Using high grade 256K memory devices, this unit is the only one which offers the high performance of no wait-state operation. Housed in a rugged metal case, the RAM-plus unit has an expansion slot which duplicates the QL's, allowing any other CST peripheral to be used. Among the advantages derived from using the RAM-plus are the performance improvements of software and storage devices, and the ability to multitask several programs at once.

* Xchange is a Trade Mark of Psion Ltd.

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Qdisc Interface 4 (3.5in. util. disc)	£79.95	£72.70
Qdisc Interface 4 (5.25in. util. disc)	£79.95	£72.80
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RAM-plus 512K QL memory	£139.95	£125.20
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CST Q-488 GPIB instrument interface	£224.25	£198.40
CST QDISC SCSI interface	£230.00	£203.40
Qdisc 4 + dual 3.5in drives	£275.00	£249.40
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3.5in Utility disc inc. Ram Drive 2	£10.00	£10.00
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Eprom V1.16 for issue 2/3 Qdisc	£15.00	£15.00
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Thor 20 1F (Single floppy)	£1292.60	£1179.00
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Thor 20 WF (Winchester + floppy)	£2212.60	£1979.00
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Available as an upgrade for existing Thor owners.
For floating point option contact CST.

For the Thor Range:

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Beige Mouse	£63.94	£57.60
Psion Chess	£24.95	£22.70

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Airmail outside Europe	£5.00

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CST reserve the right to alter prices and specifications without prior notice

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Please deduct my Access/Mastercard/Eurocard/Diners Club/Vector a/c

Card No.

Expiry Date

Signature





Thor XVI Announced at the PCW Show

Both customers and dealers showed great interest in CST's latest project, the Thor XVI. Built around Motorola's 16 bit MC68000 chip, it incorporates all new hardware and while fully QL compatible has none of the limitations associated with the 8 bit QL board.

While visiting the CST stand Sir Clive Sinclair was able to inspect the prototype Thor XVI. Commenting on the "beefy" 68000 chip he said he was "definitely interested" in the developments and progress made by CST.

Amongst the new Thor's innovations, the system is capable of providing up to 6.5 Mb of RAM, a 20 or 40 Mb Winchester hard disc and up to two floppy drives. The operating system has been streamlined to make full use of the Thor XVI's powerful hardware facilities, while retaining the advanced features of the Thor 1, including the screen windowing system, Ram Drives, floppy disc software from QJump and SPEEDSCREEN (see separate article).

Projections

CST's proprietor, David Oliver said that he expected production of the XVI to start at the end of the year. Pricing was expected to

start at around £100 (ex VAT) above the equivalent 8 bit Thor model.

Other items which attracted particular attention at the show were the Psion Thor Championship Chess, Digital Precision's Desktop Publishing System and the Thor 21 running high speed floating point maths, and even Z80 BBC Basic via a CP/M emulator.

Much interest was also shown in graphics demonstration software, the Xchange suite and (of course) the Marlow Bar (opposite the stand) and - amongst the younger enthusiasts - the ubiquitous bright yellow Thor balloons.

Upgrade Path for QL Owners

CST continue to support QL enthusiasts wishing to upgrade their system to a Thor, by offering a £70 trade-in on QL's (in working order!). CST customers with Qdiscs, 3.5" disc drives and RAM-pluses should contact CST for a quotation.



Sir Clive discusses the Thor with David Oliver and Dansoft's Helmut Stuenen.

New ROMs at PCW Show

Two system expansion ROMs for the Thor were shown at the PCW show. These are both available now and can be fitted by your local dealer.

The InterLogic INTROM I from Denmark integrates the Talent Screen Editor, QJump's Toolkit II and Digital Precision's Turbo Toolkit SuperBASIC extensions and Buvex's Thor Dump screen dump into one package costing £49.45.

Creative CodeWorks' SPEEDSCREEN rom by Simon Goodwin improves screen text output in mode 4 by 3 to 12 times

(depending on colour etc.) at all times. SPEEDSCREEN will be the standard screen driver on the Thor XVI. Packaged together with a disc providing enhanced 72 pixel fonts the rom is priced at £29.90.

SPEEDSCREEN is also available on disk or cartridge for the QL at £20.00.

For further details, contact CST on 0438-352150.

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Next Month: Further Details on THOR XVI

Most computer programs involve the manipulation of data but the poor provision of data structures and associated commands in Basic leads many people to believe that the subject begins and ends with simple arrays. In this major series, Mike Lloyd explores the subject of data, its structure and its manipulation.

Before computers, data was called information. There is so much information around us that occasionally we do not recognise it for what it is and rarely analyse its structures and conventions. Because computer programs spend so much of their time using, storing, generating and manipulating information, the whole subject of data has been thoroughly researched in the last 20 years and powerful data management tech-

niques have been developed.

This article is the first in a series which will tackle in-depth a subject which will perhaps be completely new to many readers – computer data structures. As there are so few books and articles widely available on the topic, *SuperBasic* will start from first principles by examining the attributes of data in general.

Data is a concept which everyone seems to understand but which defies simple definition. Dictionary definitions explain that data is the representation of the attributes of things. A car can be described by its make, model name, colour, engine size, seating capacity and so on, and those facts constitute data. A subtle but important distinction is that, in computer science at least, data is not the actual attributes being described but the description of them.

Data can be stored and transmitted, which might not be possible for the attributes being described. A computer cannot store the capacity of a car engine but it can represent it with the string "1300cc". Some things can be understood only in terms of their data. The workings of a 68008 microprocessor are too fast for human comprehension and are invisible to the eye but the chip can be described as having a 32-bit internal architecture which runs at a speed of 7.5MHz.

To make certain there is no confusion between data and what it represents, the real attributes which data describes are referred to as *data content*. Data can be expressed in many ways without misrepresenting the data content; *twelve*, *12*, *XII*

and *dozen* all refer to the same quantity.

Beyond the simple dictionary definition of data there are other factors of great importance to a thorough understanding of the subject. An obvious point is that data, being plural, refers to a collection of information. Some pieces of information are completely unconnected, for instance the average age of QL users and the proverbial price of fish, and they would not commonly be described collectively as data. Related information forms a definite entity, referred to as a *data set*. The relationships between elements in the data set form the basis of the *data structure*.

Incidentally, *data* is one of those words which cannot decide whether to be singular or plural. Strictly speaking, it should be plural because there is a perfectly serviceable but little-used word, *datum*, which represents one item of data. "The data is correct" seems preferable to "the data are correct". Rather than be pedantic, *SuperBasic* has succumbed to popular usage.

A telephone directory is a good example of a *data set*. Each element in the data, in this instance the information relating to an individual subscriber, is a *record*. Within each record the information is divided into sub-groups called *fields*. Telephone directory entries each have four fields – the subscriber's name, the address, the exchange and the telephone number.

The human mind is very accomplished at assimilating data but the process is heuristic and it is often carried-

out subconsciously. In other words, the brain associates information with rules which have been previously learned and through frequent practice the process becomes second nature. The advantages of structuring data can be demonstrated by imagining learning the multiplication tables in a completely random order. Even though the information is exactly the same as that learned by rote in primary school, the task might well prove insurmountable.

Computers also need rules to manage data but in Basic most of the rules have to be specially programmed; other languages are favoured with much more sophisticated data structures and associated commands. Unfortunately there is no computing parallel to the ability of the brain to learn from experience and carry-out tasks subconsciously.

For information to have order, its elements must have value. This is particularly relevant in computing, because everything in a computer memory is stored numerically. A poem contains information and has structure but its contents are not easily-assigned values and therefore a poem is not a good example of data and computers are not very good poets. A catalogue of poetry books classified by author, publishing house, subject matter and date of publication has all the characteristics of a data set because comparisons and evaluations of the individual entries are possible.

Some data has a natural structure as the digits 1-9 on a keyboard are arranged naturally in ascending order so that their inter-relationship

ships are obvious. Unfortunately, the same cannot be said for the alphabetical keys. Some data sets can be displayed in a variety of ways. The organisation chart in figure one is laid out to show the hierarchy of control in a company, known as its functional structure. The same information could be presented in other ways to meet other requirements – in the form of a site plan to identify office locations, or alphabetically in a telephone index.

On the other hand, some data does not have a natural structure and therefore must have one imposed on it. The ordering of letters in the alphabet is consistent but it is entirely arbitrary, allowing words to be placed in alphabetical order and retrieved from a list relatively simply.

Sometimes the organisation of data infers information which is not stated explicitly. Football League tables could be listed alphabetically for ease of reference but they would not then convey the relative positions of the teams readily. Other similar data structures include the record charts, bus timetables and calendars.

Dynamic data set

The First Division is an example of a *static data set* because although the position of its elements keeps changing there are always the same number of teams. A telephone directory, on the other hand, is a *dynamic data set* because it grows and shrinks as insertions and deletions are made, even though the information it contains is never fundamentally re-ordered.

Static data sets are readily stored in arrays but dynamic data sets are more difficult to program. The absence of dynamic data structures in Basic is one of its major shortcomings but one which can be corrected by the programmer.

As well as content and structure, other important attributes of data for computing purposes are its ac-

curacy, accuracy and density. The acuity of data refers to its vagueness, or lack of it; "acidic" is an imprecise, but true, description of a liquid with a pH balance of 2.45. Sadly, computers are inherently very precise and rarely vague about anything.

There is a clear distinction between the acuity and the accuracy of data. If the pH balance of a liquid is given as 2.45 when it is really 1.79, the datum is not vaguely correct but precisely incorrect. Computers often store values to ridiculous extremes of spurious accuracy or find it impossible to express a number correctly.

Binary fractions

The conversion of decimal fractions into binary fractions in particular can lead

example of densely-packed information, because those two letters stand for the potential of hydrogen, which is equal to the common logarithm of the reciprocal of the concentration of hydrogen molecules per cubic centimetre of a solution.

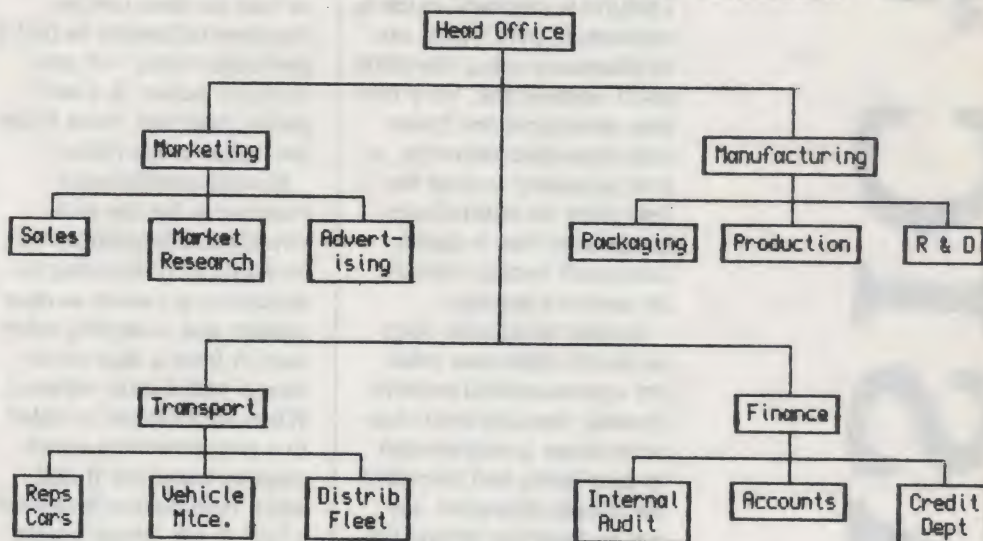
Base month

A common example of the advantages of compressing data is the way a date can be held in computer memory. At its least dense, the date could be a 14-byte string such as "12 August 1987" but the same date can be represented in two bytes, the last five bits representing the day of the month and the remaining 11 bits representing the month and year as an offset from a chosen base month. This sys-

order of information system on which other data structures are based and it is often taken for granted. Misreading "Stretford" for "Stratford" will cause a letter to be misdirected even if the address is correct. In computing terms, a low-level error has corrupted a high-level data operation.

Hierarchies of data systems can be complex in computing. To display a character selected from a string array, for instance, a binary number is interpreted as an ASCII value, the shape of the character is obtained from a 9-byte binary image stored in the ROM font and the screen map is amended to display the shape using the current paper and ink colours and the print position obtained from

Figure 1. The Utterly Structured Data Corporation



to significant inaccuracies and again Basic is ill-equipped to deal with the problem compared to some other languages. Some things, such as the acidity of a substance, can never be expressed with total accuracy because there will always be an extra decimal place which can be added to express an extra degree of precision but discreet values such as integers can be handled more precisely.

Densely packed

The density of data indicates how much information is stored in a specific portion of memory or conveyed by a certain number of symbols. The acronym pH is an

tem can represent any date in a period of 170 years.

Data sets are rarely viewed in isolation. To make sense of them, other data sets and other rules and relationships might need to be understood. The ability of the brain to absorb information and to take in the underlying data structures is phenomenal, even when considering something simple like someone's address. What we call an address on an envelope will now be recognised as being nothing of the kind; it is the *representation* of an address and a good example of data.

To understand an address, a postman must first be able to read. Reading is a lower

a system variable table. In all, four data structures are involved.

Returning to the interpretation of an address, a postman must also be aware that geographical entities such as roads, districts, counties and countries exist and that they are given names.

Concentric entities

It is also important to know that these entities are concentric, i.e., that a road is in a district, a district is in a county, and so on. The relationship is reflected in the structure of an address;

PART III Super BASIC

each line of the address expands on its predecessor.

A postman must finally be aware that 15 Acacia Road lies between 13 and 17 Acacia Road. Without an understanding of the concepts of addresses and basic concepts of language and numbers, letters could not be delivered accurately.

Having expounded the general nature of data structures, the characteristics of

computer-based data sets can be examined. Basic has only one data structure, arrays, which tends to limit a programmer's imagination when defining a data structure.

Although automatically-defined Basic arrays might be ideal for some applications, in many circumstances there are worthwhile advantages to be gained from abandoning them and building a user-defined data storage area in memory space reserved with the RESPR command. The techniques involved will be introduced later in the series.

A persistent problem with computer memory is that it is essentially linear; it starts at address 0 and, in the case of the QL, continues sequentially until memory address 1,048,575 is reached, which is the highest byte which can be addressed using the 68008 20-bit address bus. Very few data structures are linear with byte-sized elements, so it is necessary to *map* the data from its multi-dimensional state into a one-dimensional format suitable for memory storage.

Regular structures such as the QL character table are accommodated relatively easily because each character shape is represented by nine bytes and therefore the fiftieth character, say, can be found by adding the result of $(50-1) * 9$ to the table start address.

Irregular structures such as a SuperBasic program are more difficult to map. The fiftieth program line can be found only by recording the number of bytes each line occupies at the beginning of each line, so that the address of the next pointer is the current address plus the contents of that address, and then hopping from pointer to pointer until the target line is reached.

The efficiency of data structures can be measured in two ways – by the amount of memory they require and by the speed with which data processes, par-

ticularly data retrieval, are carried-out. Most data structures involve a compromise between those two performance ideals and the choice of structure will depend on the nature of the application.

Although the scope for organising data seems to be almost unlimited there are surprisingly few operations which can be carried-out on data. Basically, data structures can be defined, updated, sorted, traced, compressed and searched.

Defining the format of a data structure involves determining the parameters of the records and fields in which the information will be stored and establishing any pointers and subsidiary structures which may be necessary. Normally at least one of the fields is ordered so that the data can be searched efficiently to find a particular entry – of subscribers' names in a telephone directory. Such fields are called *access fields*.

Having established a framework for the data structure, information can be added to it. Entering information is known as *data capture* and obtaining information from a data structure is called *data retrieval*. When information is added to a data structure, space must be found for it and when information is deleted a hole is left which wastes space. Data management programs therefore normally include routines to allocate memory space efficiently and to re-cycle space where data is no longer current. The latter task is inevitably known as *garbage collection*.

Unless data can be accessed readily a data structure is of limited value. A dictionary in which the entries occur at random would contain exactly the same information as its alphabetical counterpart but the inability to find a given entry quickly would make it almost useless. The methods of calculating where in a structure specific records are located are known as *access algo-*

gorithms. In simple, regular structures such as the character table already discussed the calculation is straightforward but in complex data structures access algorithms become correspondingly complicated.

Through the years, programmers have researched extensively the problems of sorting data into order. Four sorting routines were published in the Better Basic feature in the January, 1987 issue of *Sinclair QL World*. By the application of some lateral thinking, efficient alternatives to alphanumerical sorting have been developed which have had important consequences for data structure design. More sorting routines and some of the alternatives will be covered in future *SuperBasic* articles.

A process sometimes associated with ordering is *tracing*, the ability to access all of the elements in a structure. As with access algorithms, tracing is relatively straightforward until data structures which are more complex than arrays are encountered. Imagine the algorithm required to access all the departments shown in the company hierarchy tree in figure one, for example.

Any process which makes data more compact is called *data compression*. One example is the way keywords are represented in the QL program storage area by a two-byte value rather than by their full name. This saves a considerable amount of space but the translation process takes so much time that loading a SuperBasic program is considerably slower than loading the equivalent compiled task. In a data structure, the entries which appear most frequently can be listed in a subsidiary table and referred to in the main data area by their positions in that table.

● Next month's *SuperBasic* begins a much more detailed look at the huge subject of data structures and starts by examining vectors and arrays.

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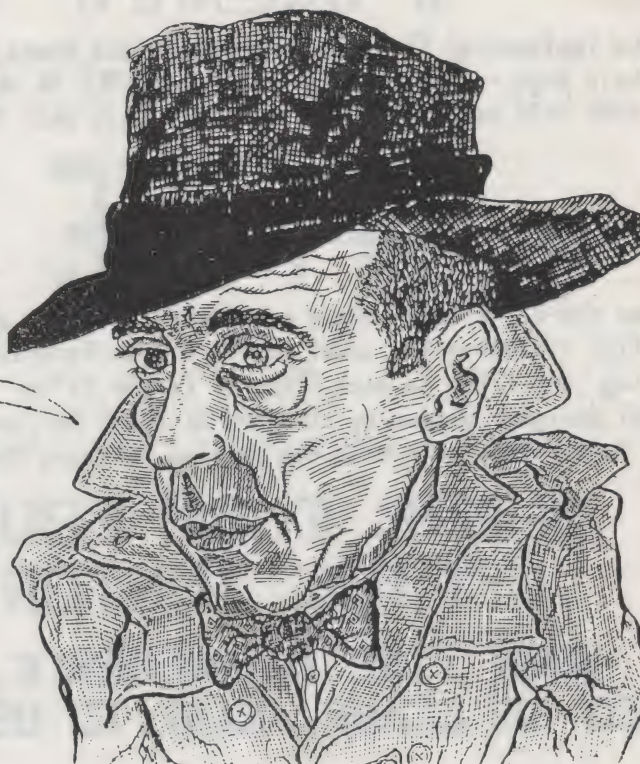
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Stephen Applebaum reviews a new offering from Byteback Software and finds it witty, difficult and entertaining. How could anyone ask for more?

Quest for the Dragon Sword
Published by Byteback
Software
Price: £14.95

Claire is not the kind of name one would expect an adventurer to have. Rod, Butch or Rex would be acceptable but Claire? Claire is the epithet with which the would-be hero in *Quest for the Dragon Sword*, a surprisingly good Quilled adventure, has been lumbered.

You would think growing-up with a girl's name would have made our hero strong in character and resolve – just look at what it did for the boy named Sue but not Claire. All his life he has been the butt of jokes and has not realised it; thick skin and an equally thick skull have protected him from his fellow adventurers' ridicule.

Quest for the Dragon Sword follows Claire on a mission so fraught with danger that no other adventurer would tackle it. Ignorant of the trials which lay ahead, our hero is sent to the isle of Zethus, a once-pleasant spot which has fallen prey to the Dragon-Witch, an evil hag possessed of the power to transmute into a dragon at will.

Before the arrival of the Dragon-Witch on Zethus, the island belonged to the Du Bois family, which, has since disappeared. There is still hope for Zethus, and possibly the Du Bois, if they are not already dead. For scattered round the island are the broken remains of the Dragon sword, an imple-

ment capable of dealing with any dragon's scales. Claire's only hope of survival, therefore, is to find the broken pieces of sword, re-assemble them, and kill the Dragon-Witch.

The Quest for the Dragon Sword is in two parts. In the first you must find the pieces of sword and in the second find the house where the Dragon-Witch abides and destroy her.

Finding the remnants of the sword involves an extensive search of Zethus. Moving about is extremely easy, since directions can be input in their abbreviated forms, i.e. N for north and S for south, SW for south-west and so on. Most actions can be performed using commands requiring very little typing. When you enter a location containing several useful objects, you need only to type 'GET ALL' to pick up everything, rather than specify each object in turn.

Quest for the Dragon

Sword has a 200-word dictionary, which is small compared to some other adventures. It is frustrating trying to perform an action which you know you must do but cannot do because you have not found the correct combination of words, a problem symptomatic of a limited dictionary.

As you would expect, Zethus is inhabited by numerous wierd characters some malevolent, others less so. A stuffed fish called Descartes is a potential ally but I found it impossible to communicate with him because I could not find the correct combination of words to use.

If it is possible to talk to other characters and I am sure it is. Byteback Software should have included instructions on how to do so in the list of commands supplied with the program documentation.

Locations on Zethus include a diamond mine, a hot air balloon, a native

village and a gnome's house. In the diamond mine you can join a guided tour, which makes it far easier to traverse what is in effect a maze but misses the juicy locations where objects crucial to your quest are hidden.

Although I did not reach the bloody ending, Byteback informs me that the climactic battle with the Dragon-Witch involves a complex fight sequence in which you must dodge and parry the dragon's attack. If you can survive the beast's fiery breath, the lash of its tail and several attempts to crush you, the name of Claire will echo around the adventurers' guild for evermore. If you fail, you will be remembered with a sneering 'I told you so'.

Quest for the Dragon Sword is witty, difficult and entertaining, and certainly a good deal more professional-looking than many other adventures written using Quill.



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GRAM is the RAM based utilities package designed to get the best out of any QL with at least 256 kbytes of additional RAM. GRAM is the starting point for any Pointer Interface system. The GRAM menus pop up at the touch of a key to provide Job, Channel and File maintenance as well as a window and Screen Dump. GRAM also includes a superfast dual mode RAM disk, a dynamic printer buffer and a print spooler. English or deutsch.

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QIMI+RTC is now available with a battery backup for the QL Real Time Clock.

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GRAM+QIMI	£54.90 (£47.75 export)		£64.90 (£56.50)
GRAM+QIMI+mouse	£89.90 (£78.00 export)		£99.90 (£86.85)

QIYP is a versatile typing checker for all users of the QJUMP Pointer Interface. Check as you type, or run your (almost) finished document through it as a final check. Pop-up windows advise you of unknown words, suggest correct spellings given partial words, and warn you about difficult words (do they get easier with practise or practice?). You can even use it from within your own programs, for instance to analyse documents for consistent mis-spellings or range of vocabulary.

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Watch this space for more QL Pointer Interface products from QJUMP.



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QEP III £129.95 (£113.00 export)

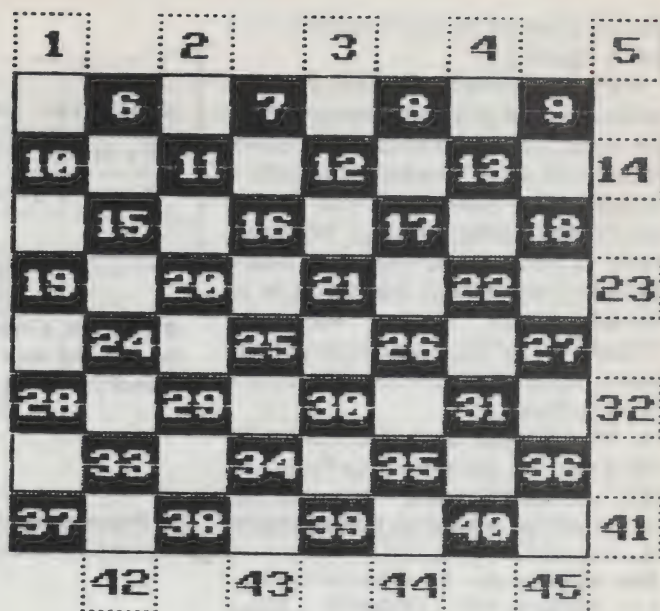
QJUMP can supply floppy disk drivers for those who have been left with unsupported floppy disk systems. Available for Medic (gets round many of the faults on some of the early Medic disk drives) and MicroPeripherals, version 3 or version 5 (provides compatibility with the rest of the QL world and improves performance).

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Al

Marcus Jeffery
continues his
artificial intelligence
draughts series



● Figure 1, the QL board numbering system with border

We will be building the skeleton of our program this month. The skeleton framework will include the board set-up, all the input/output routines and a number of necessary associated procedures and functions.

One of the first decisions must be the data structures we are to use and the most fundamental is the board; although draughts is played on a 64-square board, only 32 of the squares are ever used. Consequently it would seem sensible to store only those positions. A little foresight about the time when we write our move-generating routine indicates that having a stored board border is useful. The resulting data structure is a 45-element array which maps on to the board as shown in figure 1.

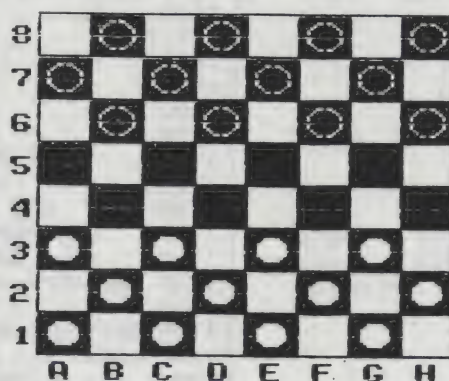
If you examine this set-up you will notice that any standard move can be generated by adding and subtracting either four or five. The array board will hold this structure for the current game position. Elements in the array are assigned values for the various pieces as given in the "init-constants" procedure in figure 5. The initial board position is defined in the "init-board" procedure.

User input

The "input-move" procedure is used to get moves from a player for the colour "col" either -1 for black or +1 for white. Entering numbers based on our "board" structure is not particularly user-friendly. Consequently a more standard A-H x-co-ordinate and 1-8 y-co-ordinate system is used in figure 2. That is then converted into a

number between six and 40 on the "board" by the function "str-to-int".

Moves are prompted for as "From:" followed by a succession of "To:" inputs. They are terminated by entering zero, "0". As explained in the first article — October, 1987 — no attempt has been made to produce elaborate graphics or user input. Very few checks are made, initially sufficient only to ensure that valid square types



● Figure 2, the A-H, 1-8 user input system

are entered. Similarly, the board display — the "print-board" procedure is fairly rudimentary, being sufficient to play the game. Anybody wishing to extend the procedures should find no difficulty with the modular program design.

As moves are entered by players the computer must somehow determine whether or not the move is valid. To do this it compares the input sequence to a list of valid moves, created by the "generate-moves" routine. That will generate all the possible moves by player "col" from the position given by "board".

As in standard draughts, no huffing is allowed. In other words, if it is possible to capture an opponent's piece you must do so. If there is more than one possible capture you may choose between them. That is handled by the true/false "jump-found" variable. If it becomes set only jump moves are considered.

Unlike such games as chess, moves in draughts have a variable length. A normal move will have a "From" square and a "To" square. A single jump will require the removal of a piece between those two squares. A second jump will have a further "To" square and the removal of another piece from the board, and so on.

Move structure

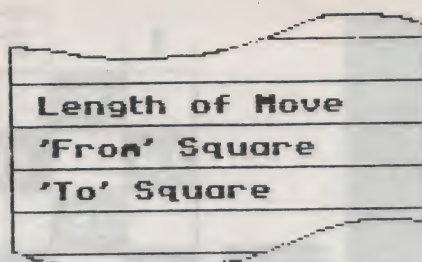
If we were to hold each possible move in an identical data structure, such as, say, the rows of a two-dimensional array, we would have to allow for possibly as many as six to eight jumps in a move and much space would be wasted. What we really need is some form of list structure but because none of the normal insert and delete list operations is necessary, a one-dimensional array compromise is used.

In all cases, at least three elements of the list will be used. The first element always contains the length of the move in the list — three for normal moves — which can be used as an offset to the next possible move when searching the list. The second element holds the "From" square and the third element holds the "To" square. Thus a standard move would

be represented by the three element list in figure 3.

If a jump is made the next element holds the type of piece removed from the board. That permits us to move backwards and forwards through a sequence of moves without losing any pieces along the way. Note that there is no need to hold the board position from which the piece is removed, as that will be ("From" + "To")/2. Look again at the board layout in figure one if you are not convinced.

So, for a single jump, the first array value will be increased to four, i.e., four elements used. Any further jumps will be added as two elements



● Figure 3, a section of the data list for a normal (no jump) move

● Figure 5, see listing below

used. Any further jumps will be added as two elements giving the next "To" square and the value of the piece to be removed. Consequently jump moves require:

$2 + 2 * \text{number of pieces jumped}$

Elements of the array, including the first offset element, are shown in figure 4.

The "generate-moves" procedure calls two further procedures; "no-jump" is fairly self-explanatory, adding all normal moves from square "sq0", using moves "k1" to "k2" from the array "m"; see the "init-vars" procedure, with colour "col". The "jump" function is a little more complex. the "jump-num" parameter, set initially

```

100 REMark ** AI DRAUGHTS **
110 REMark *** PROGRAM ***
120 :
130 init_constants
140 init_vars
150 init_board
160 REPEAT loop
170   input_move(-1)
180   input_move(+1)
190 END REPEAT loop
200 :
210 REMark *****
220 :
1000 DEFINE PROCEDURE init_constants
1010   bking = -2 : black = -1
1020   empty = 0 : bordr = 9
1030   wking = +2 : white = +1
1040   TRUE = -1 : FALSE = 0
1050 END DEFINE init_constants
1060 :
1070 DEFINE PROCEDURE init_vars
1080 LOCAL i
1090   RESTORE
1100   DIM board(45), move_list(200)
1110   DIM m(6)
1120   FOR i = 1 TO 6 : READ m(i)
1130   DATA +4,+5,-4,-5,+4,+5
1140 END DEFINE init_vars
1150 :
1160 DEFINE PROCEDURE init_board
1170 LOCAL i
1180   FOR i = 6 TO 40 : board(i) = empty
1190   FOR i = 6 TO 18 : board(i) = black
1200   FOR i = 28 TO 40 : board(i) = white
1210   FOR i = 1 TO 5
1220     board(i) = bordr
1230     board(i+40) = bordr
1240     board(9*i-4) = bordr
1250   END FOR i
1260 END DEFINE init_board
1270 :
1280 DEFINE PROCEDURE input_move(col)
1290 LOCAL t_list(50), mess$, illegal, sq$, t_top
1300   illegal = FALSE
1310   top = 1 : generate_moves(col)
1320   mess$ = ""
1330   REPEAT get_move
1340     print_board
1350     INK 2 : PRINT \mess$\\
1360     REPEAT get_from_sq
1370       INPUT "From: "; sq$
1380       t_list(2) = str_to_int(sq$)
1390       IF illegal THEN
1400         PRINT "Illegal square: "; sq$
1410       ELSE
1420         EXIT get_from_sq
1430       END IF
1440     END REPEAT get_from_sq
1450     t_top = 3

```

```

1460   REPEAT get_to_sq
1470     INPUT "To: "; sq$
1480     IF sq$ = "0" THEN
1490       EXIT get_to_sq
1500     ELSE
1510       t_list(t_top) = str_to_int(sq$)
1520       IF illegal THEN
1530         PRINT "Illegal square: "; sq$
1540       ELSE
1550         t_top = t_top + 2
1560       END IF
1570     END IF
1580   END REPEAT get_to_sq
1590   t_top = 1
1600   REPEAT check_legality
1610     IF t_top >= top THEN
1620       mess$ = "Illegal move. Try again"
1630     NEXT get_move
1640   END IF
1650   FOR i = t_top+1, t_top+2 TO t_top+move_list(t_top)
1660     IF move_list(i) <> t_list(i-t_top+1) THEN
1670       t_top = t_top + move_list(t_top)
1680     NEXT check_legality
1690   END IF
1700   END FOR i
1710   EXIT get_move
1720   END REPEAT check_legality
1730   END REPEAT get_move
1740   make_move(t_top)
1750 END DEFINE input_move
1760 :
1770 DEFINE FUNCTION str_to_int(x$)
1780 LOCAL x,y,z
1790   x = CODE(x$(1))-64
1800   IF (x<1) OR (x>8) THEN illegal=TRUE : RETURN 0
1810   y = 8 - (CODE(x$(2))-48)
1820   IF (y<0) OR (y>7) THEN illegal=TRUE : RETURN 0
1830   z = 10 * y + x
1840   RETURN (z DIV 2) - (z DIV 20) + 5
1850 END DEFINE str_to_int
1860 :
1870 DEFINE PROCEDURE make_move(index)
1880 LOCAL m_len,i,sq0,sq1
1890   m_len = move_list(index)
1900   move_list(index) = move_list(index+1)
1910   FOR i = 1 TO (m_len-1) DIV 2
1920     sq0 = move_list(index)
1930     sq1 = move_list(index+2)
1940     board(sq1) = board(sq0)
1950     board(sq0) = empty
1960     IF ABS(sq0-sq1) > 5 THEN
1970       board((sq0+sq1)/2) = empty
1980     END IF

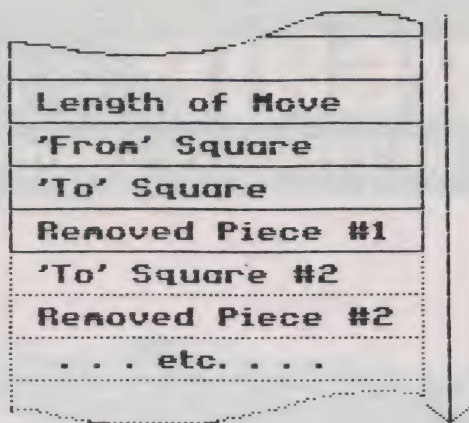
```


to one, holds the number of pieces jumped in a single move. If a one-piece jump is found, the "t-list" structure, is updated, the move is made on "board", and the function calls itself recursively to see whether further jumps are possible.

When this is no longer the case i.e., NOT(jump) is true, the present "t-list" structure and the computer drops out of one level of the recursive calls. Though possibly not immediately obvious this will ensure that copies of all possible jump sequences are included in the final "move-list".

Our skeleton program is now complete but does not allow the computer

● Figure 4, the data list for jump moves



to play the game. Instead, lines 160 to 190 have been included temporarily. This infinite loop allows you to play yourself or a friend, alternating between black and white moves. It also allows you to convince yourself that the program is operating correctly, as all moves will be checked by comparison against the list of legal moves produced by the "generate moves" routine.

● Next month we will add a few evaluation features to see what standard of play the program can achieve with a one-move lookahead.

```

1990      index = index + 2
2000  END FOR i
2010  FOR i = 6 TO 9
2020      IF board(i)=white THEN board(i)=wking
2030  END FOR i
2040  FOR i = 37 TO 40
2050      IF board(i)=black THEN board(i)=bking
2060  END FOR i
2070 END DEFine make_move
2080 :
2090 DEFine PROCedure generate_moves(col)
2100 LOCAL t_list(100),sq0,jump_found
2110      jump_found = FALSE
2120      FOR sq0 = 6 TO 40
2130          IF (board(sq0)=col) OR (board(sq0)=2*co
1) THEN
2140              k1 = 2 + SGN(board(sq0))
2150              k2 = 2 * ABS(board(sq0)) + k1 - 1
2160              t_list(1) = sq0
2170              IF jump(sq0,k1,k2,col,1) THEN
2180                  jump_found = TRUE
2190              ELSE
2200                  IF NOT jump_found THEN no_jump sq
0,k1,k2,col
2210              END IF
2220          END IF
2230      END FOR sq0
2240 END DEFine generate_moves
2250 :
2260 DEFine FuNction jump(sq0,k1,k2,col,jump_num)
2270 LOCAL k,j,poss_jump,sq1,sq2
2280      poss_jump = FALSE
2290      FOR k = k1 TO k2
2300          sq1 = sq0 + m(k)
2310          IF (board(sq1)=-col) OR (board(sq1)=-2*
col) THEN
2320              sq2 = sq1 + m(k)
2330              IF board(sq2) = empty THEN
2340                  IF NOT jump_found THEN
2350                      jump_found = TRUE
2360                      top = 1
2370                  END IF
2380                  t_list(2*jump_num) = sq2
2390                  t_list(2*jump_num+1) = board(sq1)
2400                  board(sq2) = board(sq0)
2410                  board(sq1) = empty
2420                  board(sq0) = empty
2430                  IF NOT(jump(sq2,k1,k2,col,jump_nu
m+1)) THEN
2440                      move_list(top) = 2 + 2 * jump_
num
2450                      FOR j = 1 TO 2 * jump_num + 1
2460                          move_list(top+j) = t_list(j
)
2470                      END FOR j
2480                      top = top + move_list(top)
2490                  END IF
2500                  board(sq0) = board(sq2)
2510                  board(sq1) = t_list(2*jump_num+1)
2520                  board(sq2) = empty

```

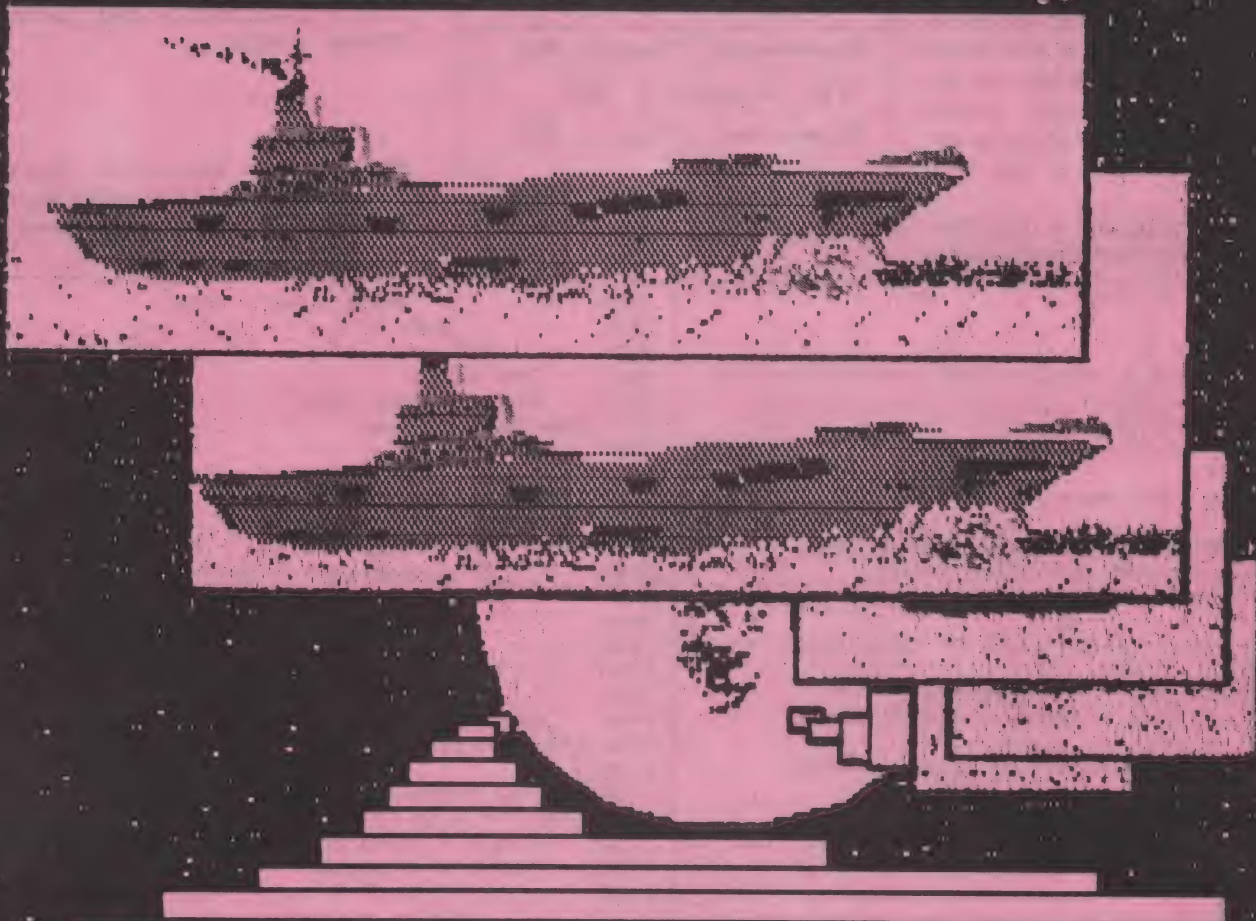
```

2530      poss_jump = TRUE
2540      END IF
2550      END IF
2560      END FOR k
2570      RETURN poss_jump
2580 END DEFine jump
2590 :
2600 DEFine PROCedure no_jump(sq0,k1,k2,col)
2610 LOCAL k,sq1
2620      FOR k = k1 TO k2
2630          sq1 = sq0 + m(k)
2640          IF board(sq1) = empty THEN
2650              move_list(top) = 3
2660              move_list(top+1) = sq0
2670              move_list(top+2) = sq1
2680              top = top + 3
2690          END IF
2700      END FOR k
2710 END DEFine no_jump
2720 :
2730 DEFine PROCedure print_board
2740 LOCAL i,j,pb(78)
2750      FOR i = 1 TO 78 : pb(i) = bordr
2760      FOR i = 6 TO 40
2770          j = (2*i) + ((2*(i-1)) DIV 9) - 11
2780          pb(j) = board(i)
2790      END FOR i
2800      PAPER 4 : CLS
2810      FOR i = 1 TO 8
2820          INK 2 : PRINT CHR$(57-i); " ";
2830          FOR j = 1 TO 8
2840              PRINT piece$(pb(10*(i-1)+j)); " ";
2850          END FOR j
2860          PRINT
2870      END FOR i
2880      INK 2 : PRINT " A B C D E F G H"
2890 END DEFine print_board
2900 :
2910 DEFine FuNction piece$(type)
2920      SELECT ON type
2930          ON type = bordr
2940              RETURN " "
2950          ON type = empty
2960              INK 2 : RETURN "."
2970          ON type = black
2980              INK 0 : RETURN "O"
2990          ON type = bking
3000              INK 0 : RETURN "X"
3010          ON type = white
3020              INK 7 : RETURN "O"
3030          ON type = wking
3040              INK 7 : RETURN "X"
3050      END SELECT
3060 END DEFine piece$
3070 :
3080 DEFine FuNction SGN(x)
3090      IF x<0 THEN RETURN -1
3100      IF x>0 THEN RETURN 1
3110      RETURN 0
3120 END DEFine SGN

```


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Colin Opie finds
the answers to
your technical
problems

TECHNICAL

Specific bouncing

I bought a Schon QL keyboard some months ago, with the promise that improved keys would be provided later. Despite several telephone calls they have not yet arrived. In the meantime, this version of the Schon keyboard has a pleasant feel to the key action, as described in your March issue, but multiple characters are a constant plague, suggesting presumably that the trouble is key bounce.

You state that can be alleviated by some POKE operations but as I am not a machine code whizz kid and am warned in the QL manual against POKEing into Qdos, I should be glad of very specific instructions. In POKE W 163980,n what are the units for n? Is n in milliseconds? And to defeat bounce should one make n larger, say n=50 or so? Similarly, in the character repeat facility POKE W 163982,n what is n? Since it defaults to 2, it may be characters per second. What value should I try there? Must it be integer, e.g., 1, or can one try a decimal, e.g., 1.5. Further, are such changes, once made, permanently locked-in until changed again? My cursor flashes at about two per second and if I hold down a key I get about 20 characters per second. Does the POKE operation first display the existing settings for n before one makes a change, so that, if necessary one can restore the *status quo*.

J. W. Boag,
Sutton, Surrey.

There have been a number of enquiries about the Schon keyboard and the use of the keyboard delay and repeat values in the system variables list. Boag's enquiry prompts an explanation.

The two system variables in which we are interested are:

Name	location	default
AUTOREPEAT DELAY	163980	30
AUTOREPEAT FREQUENCY	163982	2

Both values are, in machine language jargon, **words** – or 16-bit values. As such they can assume a value between 0 and 65535. They cannot be programmed with decimal values such as 1.5 because only integer values can be **PEEKed** and **POKEd** into the variable space.

As they are 16-bit word values we will always use the statements **PEEK-W(location)** or **POKE-W(location,value)**. They are not related to such things as characters/second but are arbitrarily pre-set values to give a reasonable response to the QL keyboard – not too fast and not too slow.

The **delay** variable is normally set to 30 by Qdos. This is an arbitrary value which provides the delay which will occur before auto-repeat starts when a key is held down. The bigger the value, the greater the delay. If you perform the statement **POKE-W 163980,60** and then hold down an entry key, it will take twice as long before the key entry starts to auto-repeat – too long in fact.

If you try the statement **POKE-W 163980,1** and then hold down a key, you will start auto-repeating straightway. The trick now is how to enter the next command (**POKE-W 163980,30**) without getting double – or more – characters as you type. Hit each key as fast as you can, like fast staccato on a piano, or re-set the QL.

The **frequency** value is best understood by considering the value to be an arbitrary delay between key repeats once auto-repeating has started. So the bigger

the value the slower will keys be auto-repeated. Try **POKE-163983,1** and hold

down a key.

Unwanted key repeats on the new-style keyboards can be a problem due to key bounce, key sensitivity and line echo problems in the hardware. Solving the problem will be a mixture of playing with the previous two values and adjusting you typing habits.

Dat brudder don't do no work

Thank you for the program – page 43, July edition – to enable data to be exported from the Brother EP-44 to the QL but unfortunately line 130 will not load. I have been able to overcome this by substituting OPEN-NEW for OPEN NEW but the “NOT FOUND at LINE 130” flag still appears.

Others, no doubt, have

Hotting up

I was very interested to read in the Trouble Shooter column the problems which seem to have been experienced with an interface and its impact on the screen. I have a JS QL and have bought from Eidersoft a PCML interface with expanded memory together with twin NEC disc drives.

Since using them we have experienced a very bad horizontal wobble on the first tenth of the top of the screen. It becomes increasingly worse as the computer is used during a session, so much so that it is difficult to read the text on the screen.

The monitor I am using is a TV/monitor made by Saba and I am enclosing a circuit diagram of this and would appreciate your advice on the connection between the 8-pin plug at the QL end, to the Scart connector at the TV end. It crosses my mind that I might not have it wired correctly which could be the cause of the problem. My only doubt about this possibility is that with my other QL, version AH, the combination of QL and monitor worked perfectly although if I then put the interface into the early ver-

sion I start to get the wobble again.

Robin Gourlay,
Hunsley, Hampshire.

If there is any one common cause for all the faults which occur with QLs, especially when interfaces are attached, it is heat. The QL has such a simplistic power supply with little regulation that it does not need much to upset the works. Coupled with this is the fact that the ULAs inside the QL do not have heatsinks stuck to the top of them. One reason, I suppose, is that there is very little height for such a convenience. Having said that, you may find the fault cures itself if you attach some aluminium heatsinks to the QL ULAs.

There is no doubt that I like the QL but I like the idea of the Sandy Q-XT640 upgrade kit even better. That kit gives the QL hardware room to breathe and also a good power supply. For the price of a box, a few connectors, an ABC Electronic IBM-style keyboard and a new switched mode power supply you could build your own version of this kit – see figure one.

Admittedly the latter solution may seem a little dras-

HELPLINE

written about this problem and so I look forward to seeing the corrected version.

**David Drysdale,
Manchester.**

I read the answer in the July issue on how to export documents from the Brother EP-44 to the QL. I was encouraged by your remarks, which suggested it was easy. It did not work for me.

A letter from Brother advised me always to use 'ser1c', rather than 'ser1'. I used both versions in line 120 without success. Also,

on line 130, the expression 'mdv2ep44doc' was changed to 'mdv2-ep44-doc'; the original expression was not accepted by the QL interpreter. I do not know the reason. On the screen, at the top left, two or three 'chessboard' characters appear; normal text does not appear. What does it mean?

I have wondered if the lead - Transform supplied it in December, 1985 - is at fault, i.e., it is not set to allow the passage of text from the EP-44 end. Perhaps it is a silly error on my part. Whatever the reason, I

would find the facility to export text a very useful one.

**Patrick Kane,
Motherwell.**

I own a brother EP-44 and I do it, so I know that nothing is funny about the program. It is true that line 130 had a misprint and that underscore characters should have existed between 'mdvi', 'ep44' and 'doc', i.e., **Mdvi-ep44-doc**, not **mdvlep-44doc**. It is also possible that the lead supplied by Transform does not permit two-way communication.

This is not a rarity in that most printer cable suppliers assume that you are **printing** and that the cable goes between a QL and a printer only. Printers, as you may well know, do not talk back.

The 'chessboard' characters imply to me that you have the baud rate or loader program wrong. Check all your channel numbers in the print statements and the values used in the **select** statement - see program in July issue. Needless to say the QL and the EP44/22 need to have the same baud rate and the EP44/22 must be in **terminal** mode.

Something not mentioned in the July issue, but probably obvious anyway, is that the EP22 does not work at 1,200 baud and therefore line 110 will need to be changed to either **BAUD 75** or **BAUD 300** depending on the state of the EP22.

Financial loss

May I refer you to figure one, of your article in *QL World*, July. I am unable to get the program to work and I think there might be misprint(s) in the listing.

**A. Horsley,
Barnsley.**

The program mentioned is a procedure for printing out monetary values in fixed point notation and in a formatted manner.

Horsley is correct in saying that misprints exist and I offer corrections.

- Line 120. No brackets () are required around the variable **v**.
- Line 210. No left-hand bracket (should exist after the statement **power 1E6**.
- Lines 220, 230, 240, 250. All reference to '0' (in quotes or not) refer to the value **zero**, not the letter **o**.
- Line 250. The first right-hand bracket) should of course be a left-hand bracket (.

tic and expensive but you are left with an arguably more reliable machine having a professional-style keyboard. A third alternative is to remove the +9V tracking from the interface card where it connects with the

regulator. Obtain a second QL power supply, cut off the plug and solder the +9V DC power line and earth connection to the regulator pins or board tracking. In that way the board is powered separately from the QL.

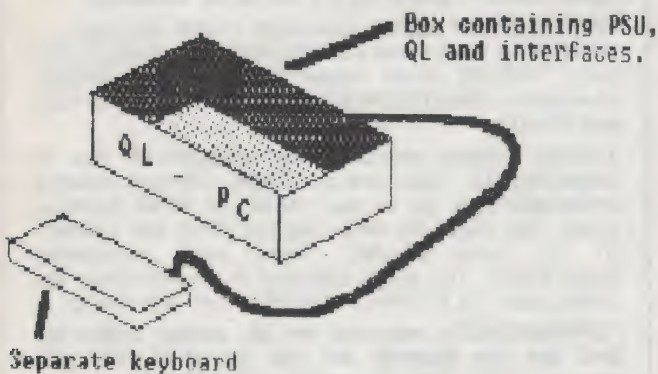


Figure 1. Boxed version of QL

Machine repairs

My QL has developed a fault which I cannot easily afford to have repaired professionally. The «CTRL» key has stopped functioning and I am unable to use it for erasing, editing, pausing or interrupting listings or programs.

I find it tiresome to use the erase/rubout functions with Quill and Abacus whenever I mistype a word

or figure and if I make a mistake when entering a listing the only way out from 'bad line' is to prefix the whole line with «PRINT '...» and then re-start the line. Since there does not appear to be any other fault, I wonder whether this is something which I can repair myself?

If not, is there a SuperBasic routine which will enable me to persuade the «ALT» key that it should act

like «CTRL» and, if so, can I add it permanently to ROM or, at least, merge it with a boot routine so that it stays in RAM while the machine is powered-up?

**Garvey Humphrey,
Birmingham.**

As you have no desire to enter the world of machine code I suggest that you have your QL keyboard repaired. If you think you have the necessary skills - i.e., you

can handle a screwdriver and push ends of cable wires into sockets - why not repair it yourself? If you telephone someone like Sector Software 0772 454328 and indicate your problem it will be able to inform you of which replacement pieces you need for your keyboard.

A keyboard membrane costs £6 and a bubble mat £3 inclusive of VAT and p&p.

Continued

TECHNICAL HELPLINE

Skyburst (as in tears?)

After many hours of inputting seven no. lines, with help at times from my two children, both enthusiastic but downhearted, *Skyburst* would not run, but printed 'error in line 1930': «continue» gave 'error in expression' for all poke lines, and line 80 was 'not found'.

I must be doing something incorrectly but do not know what. I have saved the program on Microdrive with «save mdv1-skyburst», but cry help to make it operate.

**T Ross Bayho,
Yeovil, Somerset.**

After many hours of inputting the program, yes? More like weeks I should think. The problem you raise has some interesting points to note. Simon Ovenston included a very simple but sensible check in his machine code program listing. Each **DATA** line – **lines 100 to 8480** – of his program holds six bytes of data and a byte total for those six bytes. If during any 'read data line' operation – see line 30 and 40 – the total is not correct you will get the message you have mentioned in your letter – i.e., **error in line xxxx**. At least you might.

The method chosen for error reporting, although helpful, is not foolproof. Suppose all your lines from **100 to 8480** are not numbered in increments of 10. The algorithm used for reporting the erroneous line number – see line 40 – will not work. So, even though it says 'error in line 1930', that may not be the case. Check that all your lines after line 100 have line numbers incremented by 10 every time.

Another fault could veil itself if you have omitted a line. It is very easy to do in a program of this size, particularly if you have not used the SuperBasic **AUTO** command to edit the lines in the first place. For every line missing, the error report will be out by one line. Check that all your lines exist.

I would not recommend using 'continue' after the program has reported an error because of the nature of the program. Get rid of any error found and then run the program again, from line 205. Make sure that you have reserved the number of bytes specified, 5,034.

In conclusion and despite its failings, the check method used by Ovenston is quick and easy to create. It would be extremely helpful if more people who wrote machine code programs would follow his example.

The cost of your repair can therefore be minimal and nothing like the £25 or more some companies charge for any repair.

Alternatively, as Christmas is approaching, why not think about upgrading your QL to one of the 'professional' keyboards. Admittedly this is expensive but worth a thought if you use your QL a good deal, especially with the Psion package.

Personal Note

This is my last Technical Helpline Column. I would like to thank all those readers who have written to me. I am sorry that space restrictions dictate that only a small selection of letters can be printed. I hope that the problems and solutions which appeared have been useful.

Colin Opie.

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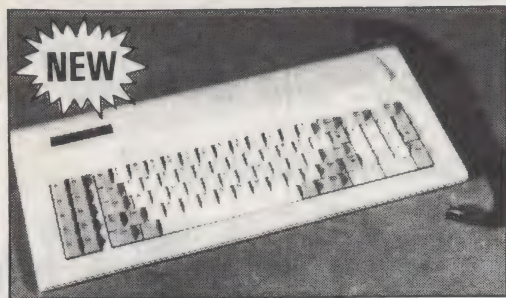
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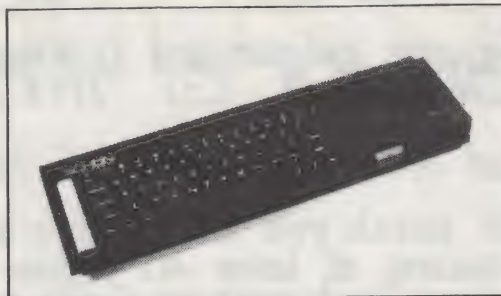
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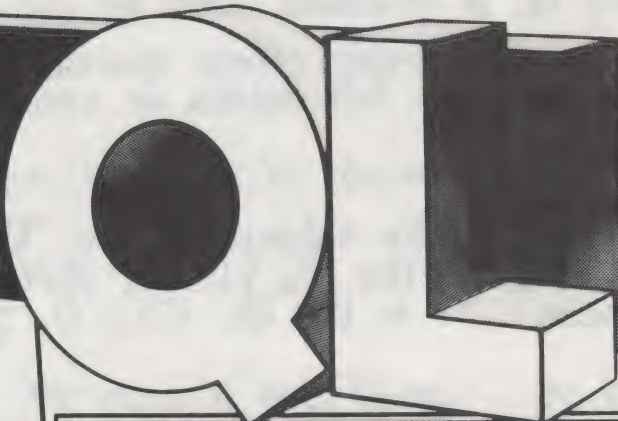
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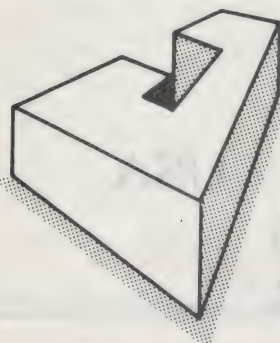
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Program of the month

Yahtzee by Jason Price

Yahtzee is a version of the well-known dice game for one to three players. Each player has 13 turns through each game. At each turn the player must first roll the dice by pressing any key - you will be prompted. They must then decide which dice to keep or hold and which dice to throw again or roll. They then decide which dice to

roll and hold for a third and final throw.

After the third throw, they must decide into which of the boxes the score will go. At the end of the game, when all the players have had 13 turns, the computer calculates the final scores and displays them. The winner is the player with the highest score.

The 13 boxes consist of ones, twos, threes, fours, fives, sixes, three of a

kind, three dice are the same — four of a kind, full house — three of one number and two of another — low straight — a run of four, e.g., 3,4,5,6 or 1,2,3,4 — high straight — a run of five, e.g. 2,3,4,5,6 — five of a kind, and chance — the dice are added together.

The game may seem complicated but after playing it twice you will find it easy.

To keep or hold a dice

press "h" into which the score should go, use the spacebar to position the arrow so that it points at the required box and then press another key, e.g., ENTER. Prompts are given throughout the program.

Make sure that the computer is not in capitals mode when it begins to run the program, as the program searches for lower-case characters.

```
100 REMark *****
110 REMark ***
120 REMark *** Yahtzee
130 REMark *** By Jason Price.
140 REMark *** B13 , SFC
150 REMark ***
160 REMark *****
170 REMark
180 RESTORE : CLEAR
190 DIM H(5), DV(5), C(13), F(3,13), SC(3,13)
200 LET BL$= "
210 SCREEN: GAME: RUN
220 DEFine PROCEDURE SCREEN
230 MODE 4: SCALE 256,0,0: PAPER 0: CLS
240 OVER 1: LET T$= "YAHTZEE"
250 FOR Y=0 TO 2
260 FOR X=170 TO 173
270 CSIZE 3,1: CURSOR X,Y: CO= 3
280 FOR LOOP= 1 TO 7
290 LET CO= CO+2: IF CO= 9 THEN CO= 3
300 INK CO: PRINT T$(LOOP);
310 END FOR LOOP
320 END FOR X
```

```
330 END FOR Y
340 CSIZE 0,0: AT 10,24: INK 2: OVER 0
350 PRINT "HOW MANY PLAYERS ( 1 - 3 ) ?"
360 REPEAT K
370 LET Q=RND(10)
380 LET K$= INKEY$
390 IF K$= "1" OR K$="2" OR K$= "3" THEN EXIT K
400 END REPEAT K
410 LET NO_PLAY= K$
420 AT 10,24: PRINT BL$
430 FOR Y= 5 TO 15
440 READ P$: AT Y,1 : INK 7: PRINT P$
450 READ P$: AT Y,8 : INK 4: PRINT P$
460 READ P$: AT Y,37: INK 7: PRINT P$
470 READ P$: AT Y,51: INK 4: PRINT P$
480 END FOR Y
490 INK 2
500 FOR Y= 51 TO 200 STEP 12.95
510 LINE 0,Y TO 190,Y: LINE 205,Y TO 425,Y
520 END FOR Y
530 LINE 0 ,51 TO 0 ,194
540 LINE 190,51 TO 190,194
550 LINE 288,51 TO 288,194
560 LINE 424,51 TO 424,194
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570 LINE 205,51 TO 205,194
580 LINE 340,51 TO 340,194
590 LINE 43,51 TO 43,194
600 LINE 105,51 TO 105,194
610 INK 4: AT 19,61: PRINT "By J.R.Price."
620 FOR LOOP= 1 TO 5: DICE LOOP: END FOR LOOP
630 END Define SCREEN
640 Define PROCEDURE DICE(D)
650 BLOCK 31,24,40*D-2,163,4,7
660 LET DV(D)= RND(5)+1
670 IF DV(D)= 1 OR DV(D)= 3 OR DV(D)= 5 THEN
680 BLOCK 3,3,40*D+12,174,0
690 END IF
700 IF DV(D)<>1 THEN
710 BLOCK 3,3,40*D+5,168,0
720 BLOCK 3,3,40*D+18,180,0
730 END IF
740 IF DV(D)>3 THEN
750 BLOCK 3,3,40*D+18,168,0
760 BLOCK 3,3,40*D+5,180,0
770 END IF
780 IF DV(D)=6 THEN
790 BLOCK 3,3,40*D+5,174,0
800 BLOCK 3,3,40*D+18,174,0
810 END IF
820 END Define DICE
830 Define PROCEDURE ROLL
840 FOR LOOP= 1 TO 5
850 FOR N= 1 TO 10
860 IF H(LOOP)= 1 THEN EXIT N
870 DICE LOOP: BEEP 30,10*LOOP
880 END FOR N
890 END FOR LOOP
900 END Define ROLL
910 Define PROCEDURE COMPLETE
920 INK PL*2: AT 3,0: OVER 0: PRINT "PLAYER ";PL
930 AT 3,15: PRINT "PRESS ANY KEY TO COMMENCE."
940 AT 17,43: PRINT "PRESS ANY KEY TO COMMENCE."
950 FOR A= 1 TO 5: LET H(A)= 0: END FOR A
960 Repeat LOOP
970 IF INKEY$<>" " THEN EXIT LOOP
980 END Repeat LOOP
990 AT 3,15: PRINT "SPINS REMAINING = 2"
1000 AT 17,43: PRINT BL$
1010 ROLL
1020 FOR LO= 1 TO 2
1030 HOLD
1040 AT 3,15: PRINT"SPINS REMAINING = ";2-LO
1050 ROLL
1060 END FOR LO
1070 CHECK
1080 CHOOSE
1090 END Define COMPLETE
1100 Define PROCEDURE HOLD
1110 FOR A= 1 TO 5: LET H(A)= 0: END FOR A
1120 FOR CO= 1 TO 5
1130 INK PL*2: OVER 0: AT 3,15
1140 PRINT "(H)OLD OR (R)OLL DICE ";CO
1150 AT 17,41:PRINT"H TO HOLD DIE, R TO ROLL IT"
1160 CURSOR 40*CO+10,189: PRINT "?"
1170 Repeat LOOP
1180 LET KEY$= INKEY$
1190 IF KEY$= "h" OR KEY$= "r" THEN EXIT LOOP
1200 END Repeat LOOP
1210 CURSOR 40*CO,189
1220 IF KEY$= "h" THEN H(CO)= 1: PRINT "HELD"
1230 IF KEY$= "r" THEN H(CO)= 0: PRINT "ROLL"
1240 END FOR CO
1250 AT 3,15: PRINT BL$
1260 AT 19,5: PRINT BL$
1270 AT 17,41: PRINT BL$
1280 END Define HOLD
1290 Define PROCEDURE CHECK
1300 FOR A= 1 TO 13: LET C(A)= 0: END FOR A
1310 FOR LC= 1 TO 5
1320 LET C(DV(LC))= C(DV(LC))+DV(LC)
1330 LET C(13)= C(13)+DV(LC)
1340 END FOR LC
1350 FOR LC= 1 TO 6
1360 IF C(LC)>2*LC THEN C(7)= C(13)
1370 IF C(LC)>3*LC THEN C(8)= C(13)
1380 IF C(LC)>4*LC THEN C(12)= 50
1390 END FOR LC
1400 IF C(7)= 0 OR C(8)<>0 THEN GO TO 1440
1410 FOR LC= 1 TO 8
1420 IF C(LC)= 2*LC THEN C(9)= 25
1430 END FOR LC

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1440 C(11)= 40
1450 FOR LC= 1 TO 6
1460 IF C(LC)>LC THEN C(11)= 0
1470 END FOR LC
1480 IF C(1)= 0 AND C(6)= 0 THEN C(11)= 0
1490 IF C(1)<>0 AND C(2)<>0 AND C(3)<>0 AND C(4)
<>0 THEN C(10)= 30
1500 IF C(5)<>0 AND C(2)<>0 AND C(3)<>0 AND C(4)
<>0 THEN C(10)= 30
1510 IF C(5)<>0 AND C(6)<>0 AND C(3)<>0 AND C(4)
<>0 THEN C(10)= 30
1520 END Define CHECK
1530 Define PROCEDURE CHOOSE
1540 AT 3,15:PRINT "CHOOSE THE BOX FOR THE DICE."
1550 AT 17,41: PRINT "SPACE TO MOVE THE ARROW,";
1560 AT 18,41:PRINT "THEN ANY KEY TO SELECT BOX."
1570 LET P=1: OVER 0: INK 7
1580 IF P<7 THEN CURSOR 205,40+10*P
1590 IF P>6 THEN CURSOR 205,40+10*(P-6)
1600 IF F(PL,P)= 1 THEN GO TO 1710
1610 IF P<7 THEN PRINT "8": ELSE PRINT "9"
1620 Repeat KEY
1630 LET KEY$= INKEY$
1640 IF KEY$<>" " THEN EXIT KEY
1650 END Repeat KEY
1660 BEEP 10,5*P
1670 IF P<7 THEN CURSOR 205,40+10*P
1680 IF P>6 THEN CURSOR 205,40+10*(P-6)
1690 PRINT " "
1700 IF KEY$<>" " THEN GO TO 1730
1710 LET P= P+1: IF P= 14 THEN LET P= 1
1720 GO TO 1580
1730 LET SC(PL,P)= C(P)
1740 AT 17,41: PRINT BL$: AT 18,41: PRINT BL$
1750 IF P<7 THEN CURSOR 114+32*(PL-1),40+10*P
1760 IF P>6 THEN CURSOR 360+32*(PL-1),40+10*(P-6)
1770 OVER 1: INK PL*2: PRINT SC(PL,P)
1780 LET F(PL,P)= 1
1790 AT 3,15: OVER 0: PRINT BL$
1800 END Define
1810 Define PROCEDURE GAME
1820 FOR GOS= 1 TO 13
1830 FOR PL= 1 TO NO_PLAY
1840 COMPLETE
1850 END FOR PL
1860 END FOR GOS
1870 AT 3,0: OVER 0: PRINT "GAME OVER"
1880 SCORES
1890 END Define GAME
1900 Define PROCEDURE SCORES
1910 FOR PL= 1 TO NO_PLAY
1920 LET TOT= 0:LET TOT2= 0
1930 FOR LC= 1 TO 6
1940 LET TOT= TOT+SC(PL,LC)
1950 END FOR LC
1960 INK PL*2: OVER 1
1970 CURSOR 114+32*(PL-1),120: PRINT TOT
1980 CURSOR 114+32*(PL-1),130
1990 IF TOT>62 THEN PRINT "35": TOT= TOT+35
2000 IF TOT<63 THEN PRINT "0"
2010 CURSOR 114+32*(PL-1),150: PRINT TOT
2020 FOR LC= 7 TO 13
2030 LET TOT2= TOT2+SC(PL,LC)
2040 END FOR LC
2050 CURSOR 360+32*(PL-1),130: PRINT TOT2
2060 LET TOT2= TOT2+TOT
2070 CURSOR 360+32*(PL-1),150: PRINT TOT2
2080 END FOR PL
2090 AT 3,15: PRINT "PRESS 'C' TO CONTINUE"
2100 Repeat LOOP
2110 IF INKEY$="c" THEN EXIT LOOP
2120 END Repeat LOOP
2130 END Define SCORES
2140 DATA "ONES","ADD ONES","3 OF A KIND"
2150 DATA "ADD DICE","TWOS","ADD TWOS"
2160 DATA "4 OF A KIND","ADD DICE"
2170 DATA "THREES","ADD THREES","FULL HOUSE"
2180 DATA "SCORE 25","FOURS","ADD FOURS"
2190 DATA "LOW STRAIGHT","SCORE 30","FIVES"
2200 DATA "ADD FIVES","HIGH STRAIGHT"
2210 DATA "SCORE 40","SIXES","ADD SIXES"
2220 DATA "YAHTZEE","SORE 50"," " " "
2230 DATA "CHANCE","ADD DICE","TOTAL"," "
2240 DATA " " " " "BONUS","IF =>63"
2250 DATA "TOTAL"," " " " " " " "
2260 DATA "TOTAL"," " " " "GRAND TOTAL"," "

```


Task Swopper (Version 2) NEW 19.95

(Upgrade price 10.00 if you return your old Task Swopper manual.)

New features:

- o True job cloning. (Saves memory, eg: 9 Psion clones in a 640K QL leaves 400K free!!)
- o Ready made and easily customised start-up menu program.
- o Automated printer driver selection (useful for program swapping and also for selecting different typesstyles from your printer).
- o Automated set up of the QL clock minimises typing by remembering the year/month/day.
- o Multitasking clock program.
- o Compatible with the QL front end program QATS.

All these features, and *Task Swopper* still only uses 10K of RAM, and is compatible with floppy discs, ROM toolkits, RAM discs and useful utilities such as QL Keydefine.

Computer One Professional Monitor NEW 39.95

(Upgrade price 20.00 if you return old cartridge - you need to keep the old manual.)

New Features:

- o Symbolic debugging including symbol management.
- o Integral 68000 assembler for single/multi line assembly and assembly from files.
- o Include files.
- o Dual screen debugging.
- o Function key control of monitor clones.
- o New commands: ass, noass, =, nojob, include, noinclude, nosymbols, noeval, swap, noswap, noclones, noflags, error, escape, sleep, base, ".

All of the above in addition to:

- o Integral disassembler
- o Tracing of code in RAM or ROM
- o Move and search memory
- o Queue tracing
- o Memory modify and display
- o Breakpoints in RAM or ROM
- o Full job inspection and control
- o Configurable multi-window display



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Mega Toolbox NEW 29.95

(Demonstration cartridge - redeemable against purchase: 10.00)

This is not just another run-of-the-mill QL toolkit. It adds over 168 new commands to QL basic, and truly breaks new ground. Extensive and original use is made of the QL's multi-tasking ability, enabling the basic programmer to perform wonders, even if he wants to compile his programs.

Main Features:

- o Designed for use by serious programmers and software houses.
- o Improved control of QDOS resources (including memory, keyboard, pipes, files, jobs, alarm clocks and tune playing jobs.)
- o Windows / graphics (saving, restoring, copying, mirroring - optional compression.)
- o New keyboard input driver for better command line editing
- o Drawing / text printing commands (eg 3D text), ideal for constructing animated slide-shows for games/advertising etc.
- o Dual screen handling (copying, swapping, automated screen mode control.)

Here are just 39 of the 168 new commands: FREE_MEM, ALCHIP, RECHIP, MCOPIE, MFILE, MSEARCH, FACT, DAYS, UPPERS, LOWERS, HEX, BIN, DEC, FILE_LEN, FPOS, GET, PUT, KEYBOARD, ENTER, ACTIVATE_Q, STICK, PROMPTS, JOBS, JOB_STAT, RMOVE, PIPE_ID, CONNECT, SET_FONT, PRINT_3D, MPRINT, EXPAND, HIDE, SHOW, ZOOM, PRINT_X, SLIDE_X, ALARM_X, QTRAP, QCALL...

Expert System Shell NEW 49.95

This is a serious tool designed both to introduce the novice to the design of expert systems, and to be used for serious expert system work. The expert system programmer can construct sophisticated rule based systems and put them into real applications. A tutorial will help you learn how to design an expert system and for ease of use, context sensitive help is provided.

Main Features:

- o Tokenised rules save memory (about 100 rules in a 128K QL).
- o Precompiled expressions for fast rule evaluation.
- o Intelligent searching and prescanning of rule base.
- o Boolean and fuzzy logic plus user definable probability relationships.
- o Formatting of input and output and ability to construct menus for the user.
- o Original constructs: FIRST OF, MIN OF, MAX OF, ALL OF
- o Conditional operators: =, >=, <=, <, >
- o Multiple goal paths... ..and much more.

Micro Anvika

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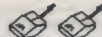
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MICE



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SMILING MOUSE	£40
COMPLETE TOOLKIT II	£30
MOUSE AND TOOLKIT	£60
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TOOLS

THE ULTIMATE BASIC EXTENSION

NO TOOLKIT HAS EVER BEFORE VENTURED SO FAR TO BRING OUT THE SUPER COMPUTER ABILITIES OF YOUR QL. THERE NOW FOLLOWS A BRIEF DESCRIPTION IF YOU WANT MORE DETAILS PLEASE DO NOT HESITATE TO WRITE.

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A COMPLETE SPRITE SYSTEM IS PROVIDED GIVING YOU 32 SUPER SMOOTH FULLY CONTROLLABLE SPRITES EACH OF WHICH MAY HAVE UP TO 16 FRAMES OF ANIMATION AND THEY CAN EVEN OUTFRAME THE QL WHEN IT COMES TO SPEED !!!

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ONE OF THE MOST AMAZING ASPECTS OF THIS TOOLKIT ARE THE NEW DESK TOP PUBLISHER STYLE CHARACTER ROUTINES THERE ARE FOUR BASIC SIZES OF CHARACTER EACH OF WHICH MAY BE EXPANDED TO ANY SIZE YOU WANT - YOU'LL FIND NO ROUGH EDGES ON OUR CHARACTERS - UNLESS YOU WANT THEM THERE JUST LOOK AT THIS ADVERT - YES THATS HOW WE DID IT.

ALL THESE FEATURES ARE EASILY USED FROM BASIC OR WHERE APPROPRIATE MACHINE CODE. A FULL SET OF DESIGNER PROGRAMS ARE INCLUDED AS IS FULL DOCUMENTATION.

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WDSoftware

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Forget syntax errors and mistyped names in file commands! Just move a cursor and press SPACE. Cursor keys or joystick allow access to up to 8 microdrives and all the discs your interface will handle, with up to 150 files on each. Scroll & print directories, COPY, DELETE or PRINT and file, select TV or Monitor mode before LOADING/RUNNING a program. Use keyboard only to set date or label a medium. Easy to use with Psion or other software. No silly icons and to learn - JOSS will tell you what it's doing! Mass copying/printing utilities and programmer's toolkit. Specify disc size, tracks and interface (CST, Cumana, PCML, MicroPeripherals) or microdrive only.

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For use with ARCHIVE 2, contains 1300 useful references and a search/print program. Find programs, articles and reviews buried in the magazines on your shelf! Cheap updates of earlier editions.

Mdv Extension Cable (8") £5.50

Add ZX Microdrives to you QL.

Joystick Adaptor £4.99

FOR THE QL, SPECTRUM, (ALL), BBC & ELECTRON:-

WD Morse Tutor £4 cassette, £6 mdv or 5¼", £8 3½"

Teach yourself to read Morse Code. From absolute beginning to 18 wpm! Feedback on screen or printer. Random letters, numbers or mixed, 100 random sentences, many helpful features include phonetic speech via Currah Micro-Speech (Spectrum). Discs unsuitable for a BBC B+.

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1. POINTER'S TOOLKIT

Pointer's Toolkit is intended to be a complementary toolkit for QJUMP's Super Toolkit II and/or QRAM or for Sandy's SuperQBoard with mouse. Naturally you can use it also without any of this hard software. It contains a background string-exchange command, for example, a command to kill all currently running jobs, a function which works like INPUT, but you may give a pre-defined text to edit (like the input used by PSION), a new RESPR which never returns not complete, even if there are jobs running, a monitor-save-job, and, if you have a command called POINTER or a file called PTR-IMI or PTR-KBD (from QRAM), there are commands which give you access to the pointer and real pull-down-windows from SuperBASIC!

WRITER'S TOOLKIT

Writer's Toolkit gives you new fonts (no normal QL Fonts), which you can use to write anywhere to the screen (with the new command WRITE). The new fonts include Old English, Antiqua, Helvetica, (and more) in different sizes. Fonts with a height of 8, 12, 16, 20, 24, 32 etc. are also possible. Now you can forget the ugly CSIZE 3, 1 QL fonts; Writer's Toolkit gives you beautiful fonts which you can use for example to make overlays for disk-labels. All fonts are defined as proportional, so Writer's Toolkit gives you not only nice looking fonts but also a nice face.

PRICE: 15£

PREIS 45,- DM

2. QL-BUS

Plug in your QL-Bus buffercard and the Expansions Port of your Sinclair QL enlarges from one to five slots with the possibility of an additional power supply. Apart from the Miracel Trump Card it can be used with

- * CST Floppy Disc interface
- * CST SCSI - Floppy interface
- * Sandy Super QBoard
- * Sandy 512k memory expansion
- * Miracel 512k memory expansion
- * QEP III E-Prommer
- * and all interfaces using the QL-Standards

PRICE: 98£

PREIS: 298,- DM

3. DOT SCIENCE + SCREENCOPY

This program, which enlarges your QDos, is usable for all scientific and mathematical texts. It can be used with all standard software programs even your own basic programs. You need no special codes to work with it because the BOOT program loads all files and programs after checking the necessary parameters. The possibility of using several characters - for example greek letters, chemical and mathematical formulas is no longer a problem. All additional and of course the normally used characters can be printed on a EPSON compatible printer.

Screencopy enables the screen to be copied in four forms and different grey colours to a dot matrix printer. It is unimportant in which application you work, any pixel of the whole screen (512 256 pixels) is printed without losing any contents! You have to press CTRL+S only!

PRICE: 29£

PREIS 89,- DM

Order form Floppy = 31/2" 2 x 80 Track

	Item	Price	Floppy	Cartridge
1	Pointer's Toolkit Writer's Toolkit	£15 DM45,-		
2	QL-Bus	£96 DM298,-		
3	Dot Science Screencopy	£29 DM89,-		

Name and address

Cheque, credit transfer to Postgirokonto Dortmund Nr. 90283-469
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MICRODRIVE

THE PROGRAMS

Author	Language	Program Name	Price
1. Giles Todd	B	DIY Assembler	£5

Featured in the March to June 1985 issues of *QL User*, this complete two-pass assembler will assemble all 68008 code and support the assembler directives DRG, END, EQU, DC and DS.

2. Richard Cross	A+O	Mini Monitor	£3
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Using approximately 3K of RAM, this handy utility will multi-task on your QL, leaving plenty of room for other programs. Commands include dumping registers, memory — and ASCII — machine code trace, register store, memory move, memory store — byte, word and long — and jumps. Featured in *QL User*, October 1985.

3. A Didcock	B	Connect4	£1
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A SuperBasic version of the classic four-in-a-row game where counters drop down slots in the vertical board. First printed in *QL User*, September 1985.

4. Shergold & Tose	B	Golf	£2
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With up to 50 courses of varying difficulty, lakes, rivers, bunkers and trees, this is a fine golf simulation. You decide the power and direction of each stroke, striving for a birdie, eagle or even an albatross. Your scorecard may be saved. This program was printed in the May 1985 issue of *QL User*.

5. Williams & Holliday	A+O	Paladin	£5
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Written completely in machine code, this excellent *Space Invaders* game was the basis of our games programming series, started in April 1985.

6. Richard Cross	M+B	Sprite Animation	£2
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This contains two programs from the April 1985 issue. The first is a SuperBasic multi-coloured sprite designer. The second contains machine code routines to animate the sprites on the screen.

7. Steve Deary	B	Pacman	£1
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A well-written maze game from the March 1985 issue. Almost 20 screens of increasing difficulty, including an invisible maze, make it a very versatile rendition of the arcade favourite.

8. Andy Carmichael	B	Family Tree	£3
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Based on an article in the August 1985 issue, this is an Archive program and database for setting-up and displaying large family trees.

9. James Lucy	L	Composer	£3
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Completed in *QL User*, October 1985 this QLiberated program will allow you to compose, play and amend your own melodies. The program will handle sharps, vary tempo, and even specify staccato and legato playing styles.

10. Matthew Capp	B	Miners	£2
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This interesting simulation, printed in the August 1985 issue, puts you in the role of the NCB, buying and selling coal and mines, hiring and firing miners, and raising or decreasing wages to match economic forces. The object is to be profitable but inexperienced players will find it difficult even to remain solvent.

11. P J Smith	B	DIY Adventure	£1
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From the February 1985 issue, this skeleton program requires you to slot in the details to create your own adventure programs.

12. R Green	B	Othello	£1
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This classic board game, printed in *QL User*, August 1985, can be played by one or two players. The display uses a 3D representation of the board. Average response time by the computer opponent is about 15 seconds.

13. S J Ackers	S	Touch Type	£4
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This program consists of a 13-lesson course for typing-in letters, words and phrases, a 700-word vocabulary, an interactive keyboard display and a fingering chart inas more than 30K of code. Scores are displayed based on the time and accuracy of typing. A reduced version of the program was printed in the August 1985 issue.

14. Rob Sherratt	A+O	Fcopy	£4
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The first part of this program was printed in the March 1986 issue of *QL World*. The program is an ultra-fast, general-purpose file spooler.

15. Alan Prior	B	World Map	£2
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From the March 1986 issue, this program will draw a full-screen, multi-coloured map of the world for geography buffs.

16. J M Dower	B	Mushyman	£2
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Printed in the June and July 1986 issues, this provides speedy SuperBasic arcade action as you munch your way round the screen.

17. Tony Quinn	S	CAD QL	£4
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CAD design programs are particularly suited to the QL. This version from the September 1986 issue includes features such as rubber-banding and a user-definable symbol library.

18. Stuart Campbell	M+B	Attack of the Things	£3
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Typical science fiction horror arcade action as yet more nasties descend on harmless QL owners. Featured in the October 1986 issue of *QL World*.

19. Karl Jeffery	M+B	Starport 2001	£3
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Fast machine code action in this November 1986 version of the *Galaxians* arcade game.

20. Marcus Jeffery	S	QL Go	£4
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The oriental game of Go is so complex that even mainframe programs are easily beaten by novice players. To the best of our knowledge, this 15x15 version from the April and May 1986 issues is the only one available for the QL.

21. J P Hartley	B	Britain	£2
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Another program for geography buffs from the November 1986 issue of *QL World*. This is a round-Britain geography quiz.

22. KBG Judson	B	Darts	£2
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Program of the Month from December 1986. This popular pub pastime requires good hand and eye co-ordination to stop a moving cursor on the on-screen board.

EXCHANGE

TO RUN
SOFTWARE

KEY	B = SuperBasic	A+B+O = Assembler and Basic Loader and Object Code
	A+O = Assembler and Object Code	S = Supercharged
	M+B = Machine Code and Basic Loader	L = QLiberate

23. Neil Taylor S Window Designer £2

This useful routine from the February, 1987 issue allows you to design your SuperBasic windows using the cursor keys. It creates a one-line procedure which, when merged into your program, will re-create that window.

24. JF Tydeman S Design 3D £4

Published in the March and April 1987 issues, this program will allow you to produce 3D screen designs with the minimum of fuss and aggravation.

25. D Carmona B Stellaris £4

Program of the Month from June 1987. This is an extensive real-time space adventure game against the computer, including economic simulations, lunar landing and superb graphics.

26. Robert Noble A+B+O Video Effects Box1 £3

These machine code SuperBasic extensions allow you to manipulate your screens, save and recall them from memory and clear them in interesting ways. Program of the Month for July 1987.

27. H R Pendry B Pontoon £3

A graphic version of the classic card game. You play against the computer. Features include changing banker on royal pontoons, accurate betting, five card tricks and so on. Printed in the July 1987 issue of *QL World*.

28. Kenneth Cameron B Picture Puzzle £2

This short but interesting program from the July 1987 issue sets up an 8 x 8 sliding block puzzle with on-screen graphics. You can select sliding numbers or load your own picture to solve.

29. Peter Etheridge B Bridge £4

An excellent version of this popular card game. Features include accurate computer bidding, automatic or manual play, replay hands, correct scoring, save and load positions and much more. Essential for card enthusiasts.

30. Charles Gerrard B Psycho £4

We must apologise but we have had to remove this program temporarily from microdrive exchange. People who have sent orders will have their money refunded and details will appear as soon as the program is again available.

31. B Otridge Crossword £5

Sold originally as a commercial program, this is the perfect aid for crossword fanatics. The program provides access by word length to a dictionary of about 12,500 words, to help solve those elusive crossword clues. Note: This program requires two Microdrive cartridges.

32. Phillip Sproston B Advent2 £4

SuperBasic arcade adventure with a humorous slant. A variety of rooms, robots and problems will keep you on your toes. Full instructions included.

33. Leslie Fahidy B Clock £3

This is a complete version of the clock program, described in the June and July 1987 issues of our QL Education series. An on-screen clock can be used to set or read the time.

34. E. Bamber QL Con- version/ Calculator £2

Comprising weights and measures units conventions and reverse Polish calculation, this excellent utility will convert almost anything to anything. Completely menu-driven, it is very easy to use.

35. John Wakefield B Qwhist £3

On August 1987 Program of the Month. It is an excellent implementation of the classic card game, Whist. Designed for or player (south) who partners a computer hand (north) against the computerised east and west opponents.

36. Stanley Sykes B Mail Merge £1

This cartridge contains very handy utilities providing a mail merge and labeller for Quill files. The cartridge includes a simple demonstration.

37. P.G. Ives B The Double £4

A large strategy game in which you manage a football team through the four league divisions. The program features buying and selling, team line-up, morale, and so on, through the full league and F.A. Cup season. The cartridge includes full instructions Quill document showing how to play the game.

38. Leslie Fahidy B Education £2

As part of our series of educational programs, this is designed to help teach the solution of simple linear equations. It is aimed specifically at the 11-plus age range.

39. JF Tydeman S Design 3D £4

Featured in the March, 1987 issue, this extensive program includes a large suite of graphics and filing utilities for the production of 2D and 3D graphics. It is supplied complete with instructions in the form of a Quill document.

40. Santiago Rubio B Roulette £3

Our September, 1987 Program of the Month, this is an excellent Spanish/English version of the traditional gambling game. It also includes the Leigh Pattern, a system to break the bank.

41. Leslie Fahidy B Money £2

Continuing with our series of educational programs, this one sends you on a shopping expedition, calculating prices from shopping lists and trying to determine what coins you will receive as change.

42. Neil Davidson A+B+OLife £2

A machine code version of the classic simulation of a colony of living cells which survive, reproduce or die according to mathematical rules. Quill instructions included.

See over page for order form.

43. Alan S Qsquidge £2
Glassbrook
Ian Swinton

An arcade hunt through an 8x8 grid expandable series of rooms for the necessary nine parts of Squidge's rocket. October, 1987 Program of the Month.

44. David Marsh B Compress £2

Compress is a utility to compress SuperBasic program files into a more compact form without losing the structure of the program. That uses less storage space and means slightly faster loading.

45. Ronnie M+B SuperBreak- £2
Davidson out

A fast machine code version of the classic wall game where, using a bat and ball, you must try to break through the wall of bricks. Special features include optional double bats and/or balls.

46. Norman Marks B Navigator £2

To calculate the distance and direction for travel between longitude and latitude positions on the Earth. The program includes an expandable list of cities on points can be input manually. The calculation formulae can be seen from within the program.

47. Richard B 3D Maze £2
Clements

Chase round the generated maze, shown in three dimensions, searching for the key to the next level before going through the exit. Extra points can be gained by passing over Point Squares but do not be carried away because it is all against the clock.

48. Jason B Yahtzee £2
Price

The November, 1987 Program of the Month was this version of the popular dice game. The on-screen graphics make the two-player program particularly enjoyable and easy to use.

49. Charles B + T FileBound £3
Dillon

A November, 1987 special for *SpellBound* owners. This extension allows users to utilise their *SpellBound* dictionaries on existing files. An additional feature allows new words to be added to the dictionary.

50. Jay B Bank £4
Lewington

This well-written, menu-driven program will allow you to keep track of a number of bank accounts, including credits and debits, dated standing orders, printed statements and much more.

51. A B Perspective £1
Didcock

Space is big. This program aims to prove it, with a graphical guided tour of the earth, the solar system, neighbouring suns, galaxy and the whole of creation.

TO ALL

CONTRIBUTORS!

Some of you have not received payment for your sales of programs because we do not have your current address. Please write to Sheila Baker at Focus Magazines including relevant information. Many apologies for the inconvenience.

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To achieve those results we have altered the format of the Exchange. Rather than calculating the number of sectors required by each program and sending the appropriate number of cartridges, we have now made it a one-program, one-cartridge system. So if you would like, say, four programs, then, regardless of length, you will need four cartridges.

There are a number of advantages to the system. First, the service will be much faster, because programs can be copied in advance. Second, rather than having to ensure having the article for documentation, we will be able to supply Quill documents on the Microdrive, if needed, for future programs.

Finally, for all new programs on the Exchange, rather than just receiving the machine code version, the Supercharged version or whatever, we will be able to supply assembly listings, hex loaders and original SuperBasic versions on the same cartridge, so that you can look at and amend programs.

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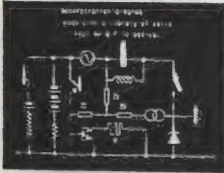
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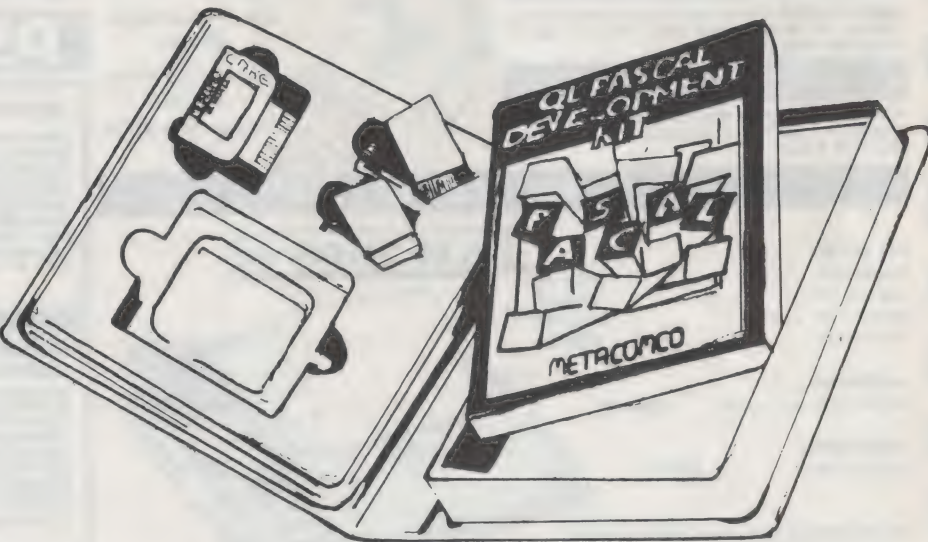
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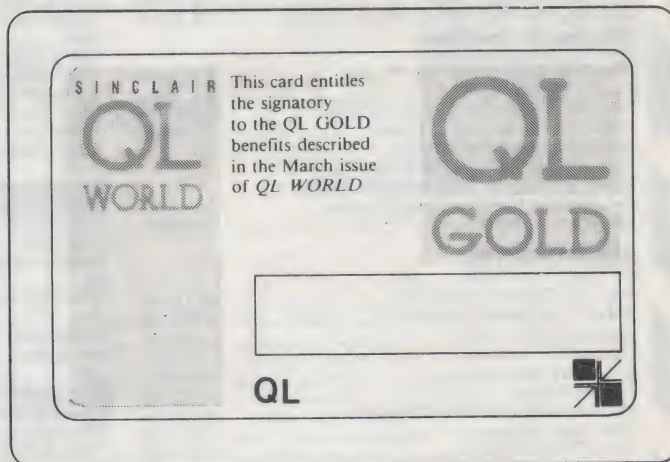
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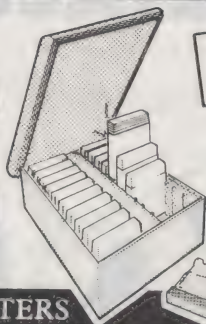
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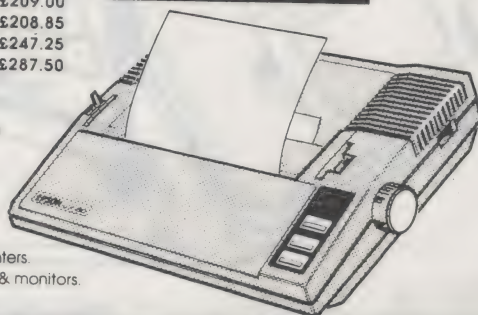
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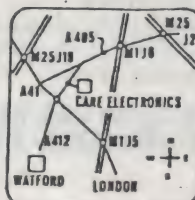
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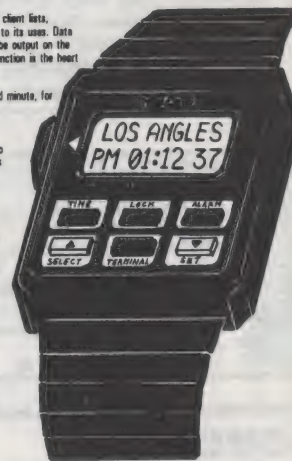
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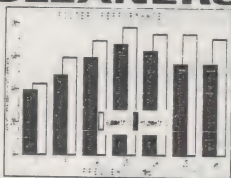
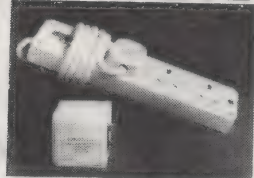
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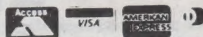
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